ELECTRICAL REVIEW

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13th August, 1948

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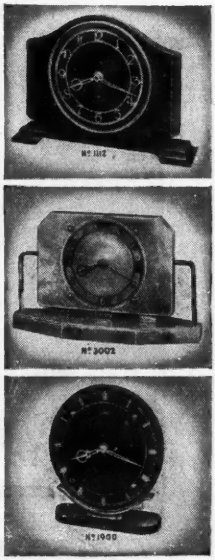

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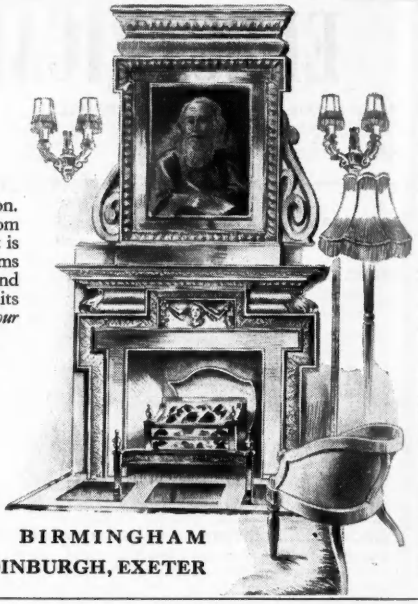

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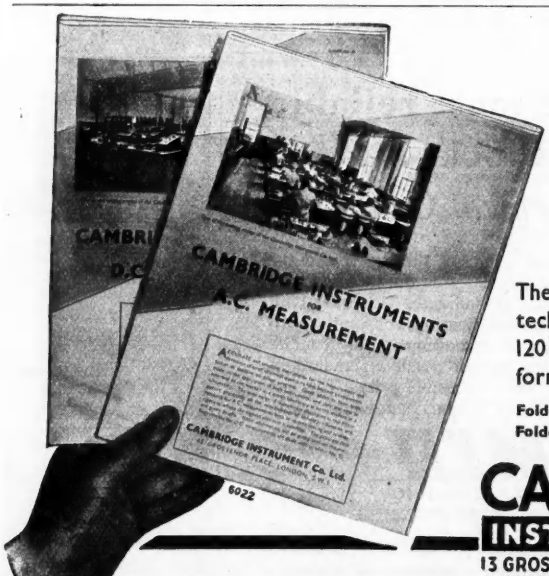

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXLIII. No. 3690 13th AUGUST, 1948 9d. WEEKLY

Britain a Shadow Factory?

QUALITY AND HIGH OUTPUT

WE have heard it suggested on several occasions recently that fine craftsmanship is incompatible with a mass production effort such as this country is committed to if export requirements are to be met. But craftsmanship does not necessarily mean hand work and individual finish. A mass-produced article can give evidence of good design and craftsmanship which, whilst not being equal in appearance perhaps to hand-finished articles, can yet bear critical examination.

High Standard Expected

Many of our electrical markets which have been won on the high quality of our products in the past, could easily be lost by offering the customer articles of poor quality instead of those reaching a high standard of excellence which he has grown accustomed to expect from us. Some letters of complaint have reached us from abroad regarding British electrical goods but these have never been on the question of price where there has been quality, but always in regard to shoddy articles which have shocked our overseas buyers because they have compared so unfavourably with the customary standard of British manufacture.

In America, where the technique of mass production is unassailably far advanced, a demand for British goods persists, but not for goods equivalent to those mass produced in America even if our price were lower, which it could never be, but for things which do not lend themselves to the American methods of huge production.

Britain should be able to offer her merchandise in a wide variety of choice, employing standardization only if there is necessity for it. Mass production on a big scale means abandonment of this flexibility in manufacture which is so vital an asset in most of our industries. Price, we believe, should seldom govern our production although value must always do so.

We are told that we must adopt American engineering and other standards if we are to compete in markets where America is well established. But surely we do not expect to be able to compete with America in the supply of replacement parts of American's own products ? Such standardization could be justified only if we could offer better and more lasting replacements, even if the price was somewhat higher.

Divergence of Methods

There would have been a much broader welcome for the proposed Anglo-American Council on Production if industrialists had not been aware of the wide divergence of production methods here and in America because of the specialized character of most of our products and some striking differences in the quality and organization of our respective labour resources. Unless Britain is prepared to sacrifice the individuality of her products and slavishly imitate the Americans we doubt if American experts can give much helpful advice to our industries.

Let us watch our policy carefully lest we wake up one day to find that our adoption

of American methods of production with American machine tools has turned Britain into just a shadow factory producing American products, but doing so uneconomically because we have not the extensive home market and general outlet to enable us to sell them in corresponding quantities.

INDUSTRIAL DRIVE AND CONTROL

WHILE we have no wish to take sides in the group *versus* individual driving controversy, we are glad to be able to describe from time to time such an installation of group driving as that dealt with on page 231, because in some quarters there is a tendency to regard group driving as out of date. This may often be true, particularly where there is no exacting relationship between the operation of the plant components or production sections. We also agree that modern methods of electrical control can satisfy all sequence control problems on the basis of individual driving, but we think there is still much to be said in many cases for group driving and many modern installations are designed for it. It looks as though the issue now is really group driving *versus* group control.

LOAD LIMITATION

IN an article appearing in this issue but written before the publication of the Clow Report (reviewed by us last week), the installation is advocated of change-over switches to prevent the use of both cookers and water-heaters simultaneously. The Committee dismissed this method, in our view somewhat cursorily. Inconvenience to consumers does not seem to have been appreciable where thermal-storage water-heaters have been associated with this system, and the encouragement of thermal storage is one of the strongest features of the Report. On the other hand, the switches could not be fitted in time for next winter, and as a long-term measure the alternative recommendations of the Committee would probably provide a better return on outlay.

CONSUMER RESEARCH

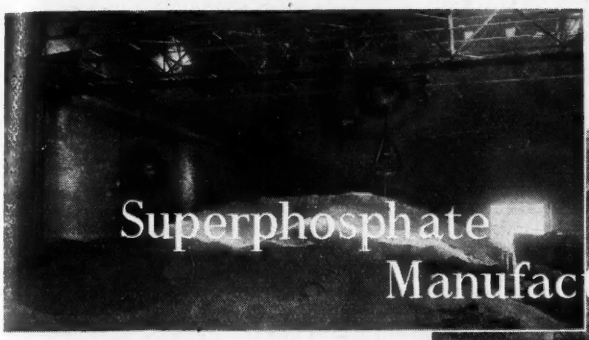
IN commenting last week on the E.R.A. "consumer-sampling" report, we suggested that investigations of this nature should be maintained as a permanent feature of electricity supply, possibly under the ægis of the B.E.A. The subsequent announcement that the work of the Electricity Supply Technology Section (K) of the E.R.A., together with the staff engaged on it, has been transferred to the Commercial Department of the B.E.A. seems the logical outcome, since such activities depended on the voluntary co-operation of undertakings now merged in the Area Boards. Continuity of the present promising methods is evidently intended, as Mr. P. Schiller, who acted as secretary of the E.R.A. Section K Committees, has been appointed first commercial assistant (distribution and utilization research) to the British Electricity Authority.

RURAL DEVELOPMENT

SIMILAR considerations apply to the appointment of Mr. C. A. Cameron Brown as agricultural electrification adviser in the Commercial Department of the B.E.A. He also was until recent years associated with the development of the Rural Electrification Section of E.R.A. (which was based on several years' experience with the Agricultural Engineering Institute at Oxford) before he joined Edmundsons' as their rural development superintendent. The removal of such functions from E.R.A. does not seem to imply changes of policy. The work was of an immediately utilitarian kind for which the Research Association provided the most readily available co-ordinating instrument on account of its close contacts with the supply undertakings.

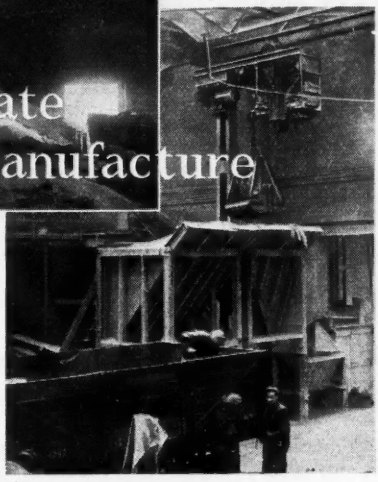
ADVICE AND EXPERIENCE

IN complaining of the delay in setting up the Consultative Councils under the 1947 Electricity Act the National Union of Ratepayers' Associations and Local Government League say that consumers are being denied their rights of representation and the Area Electricity Boards are being deprived of the advantages of consultation with local authorities whose experience of electricity supply and distribution would be of inestimable value. The Union may be right as regards its first point but we have the impression that the experience of electricity supply and distribution were acquired by the Area Boards when they took over the administrators and engineers of local authority (and company) undertakings. But we agree that if the Councils are to be appointed at all 'twere best done quickly.



Superphosphate Manufacture

Good Examples of Group Drives

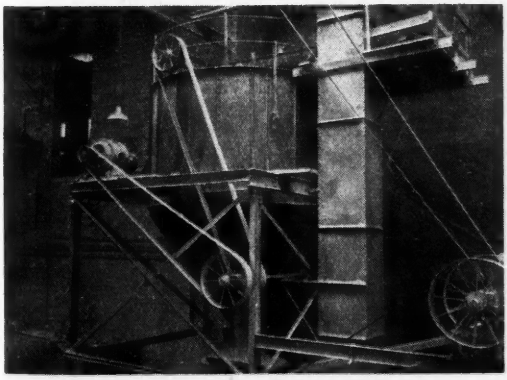


The crane discharges the rock either into a 4,000-ton storage bay or direct to the milling plant

BY the courtesy of Scottish Agricultural Industries, Ltd., we were recently able to inspect the electrical applications involved in the manufacture of superphosphate fertiliser at the Ayr Chemical Works.

In the production of the fertiliser phosphate rock is treated with sulphuric acid, resulting in the phosphate becoming much more readily soluble. The rock, which is obtained from North Africa, is received at the works in railway wagons on a siding with a storage bay on one side and the main milling plant on the other side. The material is removed from the wagons by a Morris overhead grab crane with a 7- to 8-cwt grab load. This crane has a bridge span of 82 ft and a 15-cwt telpher hoist, and there are also long and cross travel motions. The long and cross travels and the hoist are served by 15-h.p., 3·5-h.p. and 8-h.p. a.c. motors, respectively, the transmission in all cases being mainly through enclosed gears to the travel wheels or the hoist winding drum. Drum-type controllers are employed for all the motors, and there is an open-wire supply pick-up scheme all along one side of the 240-ft shed.

The crane discharges the rock either into the 4,000-ton storage bay or direct to the receiving hopper of the milling plant which reduces the material to a size suitable for dissolving—usually a grist of 53 to 58 per cent through 100 mesh B.S.S. From the receiver the rock first flows through a star feeder on to a belt conveyor serving a bucket elevator which delivers the material to an overhead air separator. This removes the phosphate of the required grist and allows the oversize material to flow into a Sturtevant ring roll grinding mill at floor level. The ground rock from the mill is elevated again to the separator.



The group drive for the separator is a 24-h.p. motor

The group drive for the separator is a 24-h.p., 600-r.p.m. motor, and transmission is first by belt down to a countershaft and then similarly up again to a 145-r.p.m. separator shaft, the final transmission being at even ratio. There is also an auxiliary transmission from the countershaft to the screw conveyor feeding the separator from the elevator.

The mill is served by a 55-h.p., 960-r.p.m. motor from which there is first belt transmission up to a 320-r.p.m. countershaft and down to the mill shaft which runs at 400 r.p.m. Final gear transmission affords 90 r.p.m. at the ring of the mill. From the main countershaft there is another transmission first down to an 80-r.p.m. countershaft and thence through gearing to the driving drum (26 r.p.m.) of the belt conveyor from the receiving hopper. Further, there is belt transmission up to the 130-r.p.m. elevator shaft from which gearing transmits to the elevator drum at 30 r.p.m. The drive for an elevator which removes dust from the mill to the cyclones is also incorporated in this group transmission scheme.

From Separator to Mixing Pot

From the separator the ground phosphate is carried by a short screw conveyor to an elevator which discharges the rock into two other screw conveyors for delivery to a storage bunker. As required, a further screw conveyor delivers the phosphate from the bunker to an elevator which discharges the material into an Avery automatic weighing machine by another short screw conveyor. Through a further screw conveyor the weighing machine delivers 5-cwt charges into a one-ton Fraser vertical pot mixer in which it is mixed with sulphuric acid.

This materials-handling system from the separator to the mixing pot, and the mixing pot itself, are the subject of a 25-h.p. group drive. The 600-r.p.m. motor is situated at about the same floor level as the mixing pot, and there is at first a simple belt transmission up to a 160-r.p.m. countershaft. Then there are belt transmission back to a pulley immediately above the mixer and final bevel gear transmission to the central vertical mixer shaft which runs at 60 r.p.m. Belt transmissions to the conveyors and elevators serving the bunker, the weighing machine and the mixing pot are all taken from the countershaft.

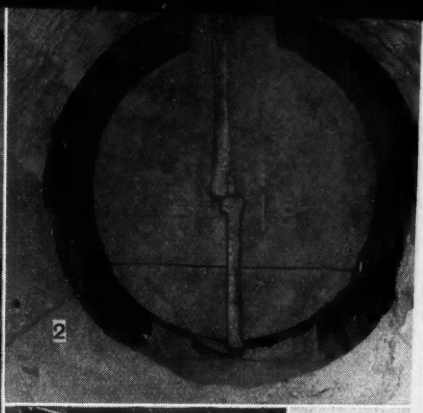
It is in the pot mixer where the phosphate and the sulphuric acid first meet, and we therefore break the continuity of our story here to deal with the other raw material from its reception at the works. The 77 per cent commercial sulphuric acid is received in rail tanks containing from 10 to 20 tons each. It is discharged from the rail tanks by gravity through acid-resisting rubber hoses into a lead-lined 100-ton brick storage tank in the works. From this works tank the acid is pumped up to a storage cistern through lead piping by a 3-h.p., 1,400-r.p.m. directly coupled motor-driven La Bour pump. In the storage cistern the acid is diluted to the required strength of about 70 per cent, and at this strength it flows as required into a double-container measuring tank from which a definite volume is allowed to flow into the pot mixer with each 5-cwt charge of phosphate from the weighing machine.

As each batch of phosphate and acid is mixed it falls into the " batch den " in which chemical reaction proceeds and the mixture thickens into a soft solid mass. The den is a horizontal cylindrical steel structure about 20 ft long and 8 ft in diameter. It is closed permanently at one end and at the other end by a wooden door swung from a pulley. This door is secured to the front by cleats when the den is being filled, and is lifted clear by the pulley when the superphosphate has set and is to be cut. There are also six small doors aligned at the bottom of the cylinder, which are removed at the same time and thus provide for the removal of the material in the manner to be described.

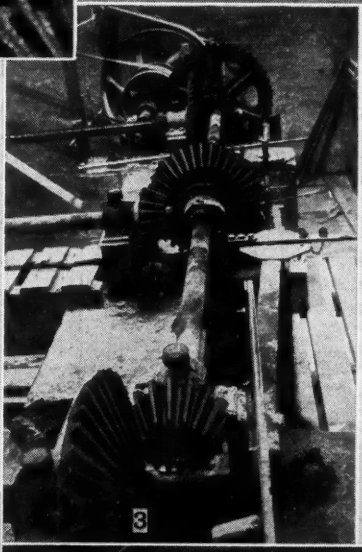
Cutting Method

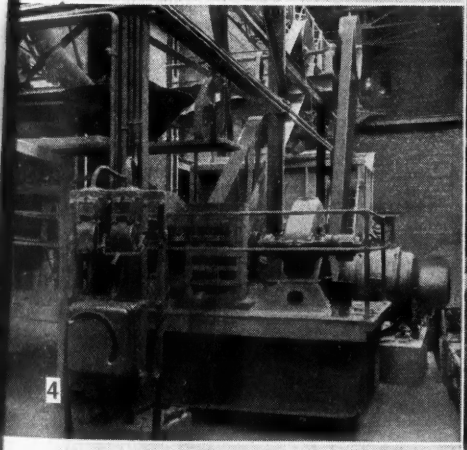
A continuous slot in the top of the cylinder accommodates an upward projection from a wooden shield by means of which the shield is held in a fixed position as a rigid structure, on the inside of which a pair of knife blades are mounted propeller wise on an externally driven shaft, coaxial with the cylinder, which runs in a bearing at the centre of the shield. The cylinder travels on wheels along a set of rails, and as it moves forward slowly the superphosphate, as the solidified mixture of phosphate and acid is now called, bears against the revolving knife blades with the result that the face of the block of superphosphate is gradually and continuously shaved off, the shavings falling through the aperture in the bottom of the cylinder.

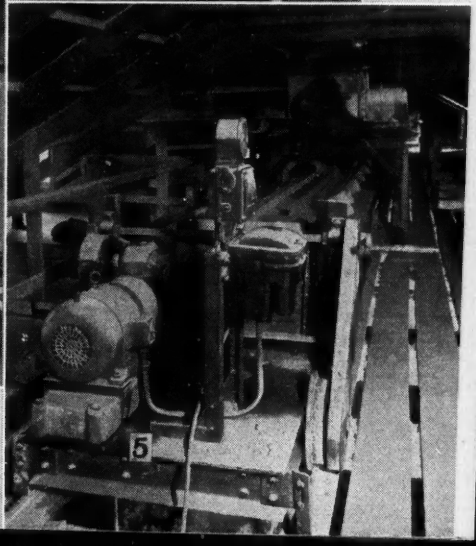
A 20-h.p. floor-mounted motor drives both the den body and the revolving knives. The first belt transmission up to a main countershaft has an actual speed reduction of 960 to 160 r.p.m. From this main countershaft there is down transmission on the other side



(1) The batch den body moves slowly forward, surrounding the front wooden door; propelling screws left and right, knife shaft centre. (2) On the inside of the batch den door are mounted a pair of knife blades; photograph from inside den. (3) From a shaft in front of the den two bevels transmit to the den-propelling screws, and the centre bevel transmits to the knives. (4) The milling plant is the subject of a 55-h.p. group drive with primary belt transmission. (5) Main warehouse conveyor serving shuttle conveyors which discharge on to the warehouse floor



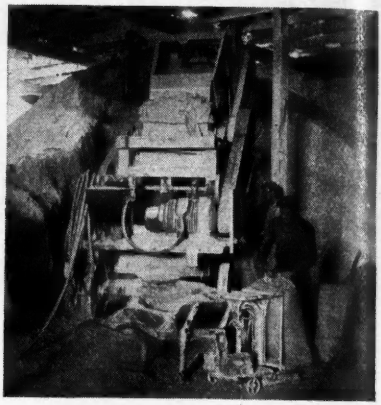




of the den to a short pulley shaft from which there is pinion-gear transmission to another shaft arranged right across the front of the den, about 20 ft from the door. On this front shaft there are three sets of bevel gears. The two outside bevels provide the transmission to the den body via two 3¾-in. screws which revolve in nuts, one on each side of and fixed to the den body. The screws revolve at 8 r.p.m. and propel the den body completely forward in 55 minutes. By a change-pulley scheme the den body is propelled back to its original position in 25 minutes, with a screw speed of 16 r.p.m. The centre set of bevels serves the knife shaft which travels at 25 r.p.m.

The superphosphate shavings fall on to a 3-h.p. motor-driven conveyor which delivers the material to a motor-driven elevator (also 3 h.p.) which discharges the product on to a main warehouse conveyor at roof level. Three shuttle conveyors disposed at right angles to the main conveyor allow the discharge of the superphosphate in any bay of the warehouse, suitable ploughs providing for the transfer of the product at the junctions of the main and shuttle conveyors. The main conveyor is driven by a 7½-h.p. motor and each of the shuttle conveyors by a 3-h.p. motor. All of these motors and those serving the conveyor from the den and the elevator run at 960 r.p.m., and transmission in each case to the conveyor or elevator end drum is by a "Radicon" speed-reducing unit.

From the shuttle conveyors the product falls on to a huge heap on the warehouse floor where it is left for a time for maturing. The matured superphosphate is reclaimed from the heap by portable bagging machines which also screen the material and break it down to a suitable size for use. Delivery is



Superphosphate is reclaimed from the heap by group-driven bagging machines

also taken from the bagging machine to road wagons for direct transit to the field. The product is shovelled into a short inclined bucket elevator on the bagging machine. The elevator feeds, through a hopper, a pair of crushing rolls which discharge into a vibrating screen from which chutes deliver the superphosphate to bags at the side of the machine.

The bagging machine is also group driven. The 10-h.p., 450-r.p.m. motor is mounted on the platform at one end opposite the elevator. Belt transmission is first up on one side to one roll shaft of the crusher, then up to a shaft at the top of the machine, from which the elevator head is served through pinion gear. From the top shaft on the other side of the machine there is belt transmission down to the other crusher roll and from this point down to the vibrating screen.

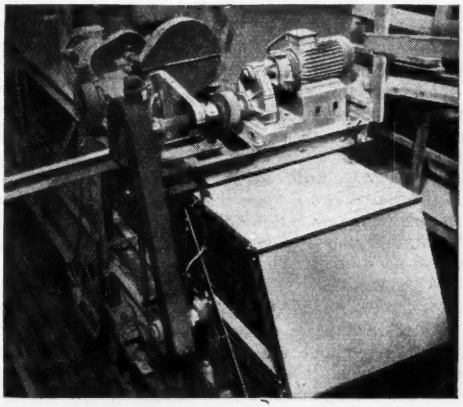
Materials handling from the separator, and the pot mixer (right) form a 25-h.p. group drive; acid measuring tank on left

The roll-shaft, top-shaft and elevator-head

speeds are 150 r.p.m., 100 r.p.m. and 100 r.p.m., respectively.

The process described in the foregoing is the batch method of manufacture of superphosphate, employing a Milch den. An alternative process in use at the same works is the continuous method employing a Broadfield continuous den. In this process two steady streams—one of acid and one of ground phosphate rock—are mixed continuously instead of in a succession of batches. The phosphate feeding arrangements are common to both methods up to the weighing machine which, in the continuous method, is replaced by a volume feeder at one end of the den.

This volume feeder consists of a rotary horizontal slab with pockets which are filled and discharged as the slab rotates. The acid is fed from a constant-level tank through a fixed-diameter nozzle. Both streams are fed into one end of a trough mixer which contains a horizontal shaft fitted with paddles which churn the mixture and gradually pass it along the mixer to the delivery end. The mixture at this point has a thick slurry-like consistency and it falls on to one end of a slowly moving den floor which is really a wide slat-type endless conveyor. It takes 40 min. for the mixture to reach the discharge end of the den where it is passed forward to meet an assembly of knife blades which revolve on a drum disposed at right angles to the direction of flow of the material. The knife blades thus pare the face of the superphosphate, and the cut material falls into the boot of an inclined elevator which delivers the superphosphate on to the common warehouse conveyor system already described.



An alternative process of manufacturing superphosphate employs a continuous den

Phosphate is fed to the den by a 10-in. screw conveyor, revolving at 60 r.p.m. and discharging into a vertical elevator with a head speed of 30 r.p.m. The elevator serves a 7-in. screw conveyor which carries the phosphate to the den feeder. These screw conveyors and the elevator are driven by a 20-h.p., 960-r.p.m. motor with transmission via a countershaft. The acid is delivered from a constant-level tank to which it is first fed from three mixing tanks at floor level by means of 1½-h.p. motor-driven directly coupled Kestner acid pumps.

The paddle mixer and the feeder table are driven by a 7·5-h.p., 960-r.p.m. motor situated at the discharge end of the den at about the mixer level. Transmission is first through two pinion gears on to a short shaft aligned with the mixer shaft and affording direct shaft transmission with the engagement of a clutch. From the short shaft there is chain transmission to the sprocket wheel of the feeder table. The mixer-shaft and feeder-table speeds are 59 r.p.m. and 15 r.p.m., respectively. The moving floor of the den and the knife drum are driven by a 7-h.p., 1,450-r.p.m. motor with transmission first by an enclosed gear unit on to a sprocket wheel from which there is chain transmission down to the knife drum which revolves at a speed of 16 r.p.m.

From the knife-drum shaft there is secondary chain transmission to a gear box from which there is further chain transmission down to a sprocket wheel on a countershaft from which there is pinion-gear transmission to the shaft of the drum of the moving endless floor of the den which is situated on the other side of the den.

We are indebted to Scottish Agricultural Industries, Ltd:, for permission to visit the works and to publish this article, and to Mr. W. L. Nicol, works manager, Mr. A. W. Thomson, process superintendent, Mr. S. Waterworth, area engineer, and Mr. E. Adams, works engineer, for their co-operation.

Views on the News

By REFLECTOR

VARIATION of electricity charges as between winter and summer months is a good idea but not a new one as it has already been extensively practised. For instance, the London and Home Counties Joint Electricity Authority had operated such a system for many years but just before vesting date announced that summer charges in a substantial part of its area were to be raised to the winter level. Now, I suppose, the South Eastern Electricity Board, which has absorbed the J.E.A., will proceed to raise the price of electricity consumed in the winter quarters; but will it also restore the summer charge to its former level?

✦ ✦ ✦

A week or two ago I commented upon Southend's decision to sell the equipment used before the war for illuminating the sea front and other features of the town. This pessimism of Southend is counterbalanced by the determination of Blackpool to persuade the authorities to allow its illuminations, which were formerly on a very lavish scale, to be used again next year. There is a strong case for them: they add mightily to the enjoyment of holiday-makers and add comparatively little to the national load at off-peak times. I see that Brighton has secured permission to floodlight a part of its beach, but this has been introduced as a safety measure for the protection of after-dark bathers.

✦ ✦ ✦

As there appears to be a good deal of controversy about the relative advantages and disadvantages of agitator and spinner types of washing machine I have been obtaining the opinions of several electrical demonstrators, or rather electrical housecraft advisers as they now prefer to be called. Generally it seems that the older agitator type machine with wringer is still more in favour, despite the fact that the spinner machine would appear to be more labour-saving since it eliminates the wringing process and lends itself to fully automatic operation. The main objections to the spinner machine mentioned by the demonstrators are that it imposes a somewhat heavy strain on the hot water system and the soap ration (fresh hot water and soap are required for each cycle of operations whereas, if the water is not too dirty, it may be possible with an agitator type machine to use it for further batches of clothes); that it is more inclined to wear out the clothes; and that clothes coming out of the spinner are in a jumbled mass, whereas after wringing they are folded ready for ironing. I am not entirely convinced by these arguments as I consider it possible that prejudice against the newer method enters into the matter.

✦ ✦ ✦

From a report in the *Glasgow Herald* it appears that a householder in that city has a somewhat peculiar installation. He has told the newspaper that before going on holiday "he carefully turned off the power at the mains." In spite of this, upon his return he found an abundant supply of hot water, for apparently an immersion heater continued to operate during his absence. It is possible, of course, that the immersion heater is on an entirely separate circuit for off-peak operation. If it is not there seems to be a clear case for investigation and one which appears to be right up Mr. Alex. Milne's street—maybe literally so.

✦ ✦ ✦

The Braddock Light & Power Co., Virginia, is between the devil and the deep sea. It is building a new 160,000-kW steam plant at Alexandria, Va., and plans chimney stacks 193 ft high. The Civil Aviation Administration which operates an airport a mile and a half away says that stacks of this height will interfere with aerial navigation but the Alexandria city authorities warn the company that anything below this height will infringe the city's anti-smoke ordinance. The C.A.A. has powers of condemnation but is bound to consider the fact that more power is urgently needed in the area.

✦ ✦ ✦

American manufacturers of radio sets are endeavouring to instil the idea of "a radio in every room" to stimulate sales. If every one was taking a different programme in a thin-walled house the result would be pandemonious. Rather less noise would be generated by the same number of vacuum cleaners in the house. The American cleaner makers have been urged to follow the radio manufacturers' line and secure a similar multiplication of machines.

PERSONAL and SOCIAL

News of Men and Women of the Industry

In our editorial section we refer to the appointment by the British Electricity Authority of Mr. **P. Schiller,** DIPL. ENG., M.I.E.E., as first commercial assistant (distribution and utilization research) and **Mr. C. A. Cameron Brown,**

Mr. P. Schiller

Mr. C. A. Cameron Brown

M.I.E.E., as agricultural electrification adviser in the Commercial Department. Their portraits are reproduced with this note.

When the electricity undertakings were transferred to the Area Electricity Boards in April last, the Gloucester and Cheltenham undertakings came under the supervision of the Midlands Electricity Board, and the local E.D.A. Circles have been transferred to the Midlands Area. **Mr. E. J. Dowson,** E.D.A. S.W. Area Officer consequently ceased to be associated with Cheltenham and Gloucester E.D.A. Circles. To mark their appreciation of the valuable services he has given over the past nineteen years, the Circles recently held a social evening at the Bell Hotel, Gloucester, at which a presentation of a tea trolley and a pair of gold cuff-links was made to Mr. Dowson. The presentation was made jointly by Mr. W. J. Bache (Cheltenham) and Mr. F. H. Corson (Gloucester), who were chairmen of the respective Circles at the time of their inauguration.

Mr. C. S. Johnston, M.B.E., general manager and engineer of the Maidstone Corporation Transport Department, resigned on 31st July to take up the appointment of deputy assistant manager of the Hong Kong Tramways, Ltd. After an apprenticeship with the Brush Electrical Engineering Co., Ltd., he joined the electric traction department of the British Thomson-Houston Co., Ltd., and later served with the Mumbles Railway of the South Wales Transport Co., Ltd., becoming engineer of that section. He served overseas with the R.A.S.C. and R.E.M.E. during the war.

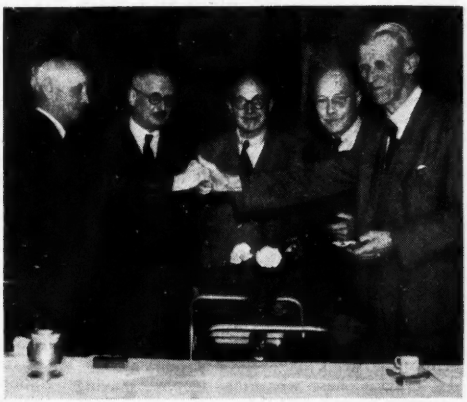
Mr. W. D. D. Fenton, commercial engineer and secretary to the North of Scotland Hydro-Electric Board, is a member of a Mineral Resources Panel of the Scottish Council which is to collect information on Scottish mineral resources and advise and assist in their utilization.

Mr. W. G. Harris (William Jacks & Co., Ltd.) has been elected chairman of the B.E.A.M.A. Hong Kong Committee and **Mr. S. A. Tremlett** (Jardine Engineering Corporation, Ltd.) has been appointed secretary to the Committee.

Mr. R. B. Hounsfield, B.A. (CANTAB.), A.M.I.C.E., A.M.I.E.E., A.M.INST.T., lecturer on traffic engineering at the University of London (University College), has been awarded a Henry Spurrier Memorial Scholarship for 1948-49 by the Institute of Transport.

Mr. K. J. McKillop, secretary of the Water Tube Boiler Makers' Association for the last three years, has been appointed director of the Association as from 1st August, in view of the widening of his responsibilities.

After investigating markets in the British West Indies and the Bahamas for nearly a year, **Mr. J. W. Shillan,** formerly managing director of the British Motor Boat Mfg. Co., Ltd., is returning to this country towards the end of August to arrange for exclusive agencies for a trading organization he has set up in the Bahamas. His address while in England will be The Close, Bodicote, near Banbury.



Presentation to Mr. E. J. Dowson, showing left to right: Messrs. E. J. Dowson, J. Newth, R. A. Parsons, W. J. Bache and F. H. Corson

Mr. A. Barnes, whose appointment as district manager at Stroud (Midlands Electricity Board)

was reported in our 30th July issue, points out that he is an Associate I.E.E. not A.M.I.E.E. as stated.

Mr. Frank Heaton, who has long been associated with the design and manufacture of electric control gear, is leaving the country for South Africa with the intention of initiating the manufacture of contactor and air-break switchgear adapted to the needs of that country. He was at one time chief development engineer with Brookhirst Switchgear Co., Ltd., and afterwards managing director of the Société d'Usinage de Matériel Electrique, Paris. He founded Contactor Switchgear, Ltd., Wolverhampton. During the war he was with the Admiralty, and till recently has been a Principal Control Officer, Electric Power, with the Control Commission in Hanover.

Mr. F. Heaton

In the third examination under the diploma scheme of the **Association of Supervising Electrical Engineers** held in various centres in May the following candidates were successful and have been awarded the Swann Diploma:—Electrical Installation and Maintenance Work: Messrs. A. J. Bryan, Birkenhead; R. E. Cave, Slough; B. H. C. Curr, Bexleyheath; F. B. King, Bexleyheath; R. Paterson, Stourbridge; J. S. Stokes, Grantham, and W. A. White, Bournemouth.

Ferranti golfers recently had an enjoyable evening competing for the transatlantic trophy presented for annual competition by Sir Vincent de Ferranti. The competition is played simultaneously in England, Scotland and Canada. After receipt of the cards from the various competition points—Manchester (Blackley Golf Course), Edinburgh (Gullane), London and Toronto—and when the necessary adjustments had been made in respect of handicaps in relation to the course, **Mr. M. K. Taylor,** of Edinburgh, was declared to be the winner with a score of 69 net, and he will hold the trophy for one year, with a replica for permanent retention. This is the second occasion on which Mr. Taylor has won the trophy, having previously won it in 1939.

Over 700 employees of the Airscrew Co., Ltd., and Jicwood, Ltd., went from Weybridge to Southsea recently in celebration of the firm's twenty-fifth anniversary. **Mr. J. D. Titler,** chairman and founder of the organization, accompanied the party.

Mr. Ivor C. Kingdon, assistant manager of the Regent Street showrooms of the London Electricity Board, has now been appointed to take charge of the Board's Electricity Service Centre in Queen Street, E.C.4.

Mr. H. W. Povey, at present accountant for No. 4 Sub-Area of the Merseyside and North Wales Electricity Board, has been appointed chief accountant to the Uganda Electricity Board. He is leaving by air on 14th August.

Mr. A. Dyson, M.INST.C.E., has retired from the position of joint managing director of the Horseley Bridge and Thomas Piggott, Ltd. He will continue to act in a consultative capacity and retains his seat on the board. **Mr. J. W. Baillie,** F.C.I.S., will now be sole managing director.

Obituary

Mr. H. E. Betts, consumers' engineer for the Battersea District of the London Electricity Board, died on 30th July. Before going to Battersea in 1930 he served with the Bradford and Kensington & Knightsbridge electricity undertakings and with Siemens Bros. and the Jackson Electric Stove Co.

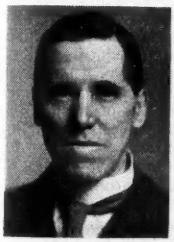
Mr. W. M. Ratcliffe.—The death is reported, at Worcester on 6th August, of Mr. Wilfred Morley Ratcliffe, J.P., M.I.MECH.E., joint managing director of Heenan & Froude, Ltd. He was sixty-two years of age.

Mr. J. R. Cowie.—The death occurred on 5th August of Mr. John Robert Cowie, A.M.I.E.E., southern area manager for A. Reyrolle & Co., Ltd., and chairman of the British Electrical and Allied Industries Research Association. Mr. Cowie, who was born in Scotland, received his technical education and engineering training in Edinburgh and Glasgow. He served his apprenticeship with David Thompson & Co., Ltd., and after further experience with the British Electric Plant Co., Ltd., and William Beardmore & Co., Ltd., joined the Glasgow Corporation Electricity Department, where he was engaged on substation and high tension work. While at Glasgow he carried out important work at the Dalmarnock power station and completely revised the high voltage network under the late Mr. W. W. Lackie and Sir (then Mr.) Archibald Page. He joined A. Reyrolle & Co., Ltd., over twenty-eight years ago and came to London as personal assistant to the late Mr. H. W. Clothier, a director of Reyrolle's, and was engaged on work in connection with the reorganization of power stations in the London area. Later he carried out similar work at power stations and collieries in the West Country and South Wales. His valuable work in connection with mining

The late Mr. J. R. Cowie

switchgear was recognized when he was elected president of the Association of Mining Electrical and Mechanical Engineers in 1936; he was hon. secretary of the London branch of the Association for many years. Mr. Cowie had been a member of long standing of the E.R.A. Council and had served on a number of its committees. He was well known for activities in the technical groups of the Electrical Power Engineers' Association and was a past member of the Council of the Institution of Electrical Engineers. He was sixty-six years of age.

Mr. S. G. Brown.—The death occurred at Sidmouth on 7th August of Mr. Sidney George Brown, F.R.S., M.I.E.E. Mr. Brown, who was seventy-five, was a versatile inventor and, it is stated, was responsible for something like a thousand patents. After education at University College, London, he turned his attention to cable telegraphy and produced a number of devices for accelerating transmission, including a drum cable relay and magnetic shunts which were adopted by the cable companies. He was also a pioneer in directional radio-telegraphy and he developed loudspeaking telephone instruments and telephone relays.



The late Mr. S. G. Brown

In the 1914-1918 war he was a member of the committee set up to devise means of detecting submarines at a distance, and he served as scientific adviser to the Inventions Board and to the Admiralty Ordnance Council for awards to inventors. Also during the war he spent much time in developing gyro compasses and his work in this connection was recognized by the extension of his patents for the record term of ten years. He designed a microphone relay which was at that time the only means of relaying wireless signals in aeroplanes. Mr. Brown was a recognized authority on precious metals.

Mr. Brown founded, with the assistance of his wife, S. G. Brown, Ltd., of which they remained directors for many years. They were also for some time directors of the Telegraph Condenser Co., Ltd. The funeral took place yesterday (Thursday).

Mr. F. H. Johnson, secretary and director of the Constructors Group of Companies, died recently. He had been associated with the Constructors, Ltd., since its foundation. He is succeeded by **Mr. J. A. Pinches,** his assistant for a number of years.

Mr. F. W. A. Handman.—The death is reported from Blantyre, Nyasaland, at the age of seventy-one, of Mr. Frederick W. A. Handman, who from 1924 to 1928 was chief engineer hydro-electric works for the New Zealand Government and from 1929 to 1936 resident engineer during the construction of the Lower Zambezi Bridge, Portuguese East Africa.

Mr. A. E. Moody.—The death occurred suddenly on 1st August of Mr. Alex. E. Moody, organizer of every "Radiolympia" Exhibition since 1928. Before 1928, when he joined the Radio Manufacturers' Association (now the Radio Industry Council), Mr. Moody was joint sales director of the British Thomson-Houston Co., Ltd. He was sixty-two years of age.

Library Lighting

THE new Westminster City Library which was opened on 15th July, is an example of how close collaboration between architect, lighting engineers and electrical contractor can result in a lighting scheme becoming an integral part of the decorative scheme. The general lighting of the book exchange vestibule is by "Atlas" 30-W fluorescent tubes concealed in the cornice above the counters, additional lighting for the counters being obtained by "Atlas" 40-W twin tube trough-reflectors let into the soffit and glazed with obscured reeded glass panels. The book rooms are arranged on two floors, "Atlas" FM/2080 totally-enclosed ribbed "Perspex" fittings being chosen for the general lighting. The vertical illumination on the backs of the books averages 10 lumens per sq ft. All the lighting equipment for the library and administrative offices was manufactured by Thorn Electrical Industries, Ltd., who also acted as lighting consultants to the architects, Ritches & Blythin. The electrical installation was carried out by Drake & Gorham, Ltd., and the architects were Richards & Blythin, F.R.I.B.A.

Failure in the Potteries Area

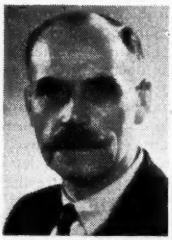
WE have been informed that the interruption of electricity supply in the Potteries area last Friday night, 6th August, was not due to an explosion at the Meaford power station as announced in some early reports of the incident. The facts are that an insulator failed, earthing the main busbar at the power station. The protective gear functioned, as intended, to isolate the faulty bar. This meant the interruption of supplies through the Potteries towns and the removal of the generating plant from load. The impression of an explosion was no doubt caused by the flash resulting from the earthing of the bar and the sudden release of steam to atmosphere as the turbines were taken off load. There was no damage to any of the station equipment other than the failure of the insulator, or from the small fire resulting from oil thrown from the switch. There was no injury to personnel. The fault occurred at 10 p.m. and the station was back on load before midnight.

Reorganization of the C.M.A.

SECTIONS NOW SEPARATE ASSOCIATIONS

THE Cable Makers' Association announces that the constituent sections of the Association which deal with particular branches of manufacture have been established as autonomous manufacturers' associations. These Associations will be affiliated to the C.M.A. and each will deal directly with all commercial and technical matters falling within its ambit. Thus, the commercial activities which, in the past, were undertaken by the C.M.A., will henceforth be discharged by the different affiliated manufacturers' associations.

Mr. B. Keywood



Mr. H. E. Helwig

Mr. E. H. Wale

The chief of these are the Mains Cable Manufacturers' Association (M.C.M.A.) and the Mains Cable Manufacturers' Association (Super Tension) (M.C.M.A. (S.T.)), of which Mr. H. E. Helwig is chairman for the current year (secretary: Mr. S. H. Robinson), and the Rubber and Thermoplastic Cable Manufacturers' Association (R.C.M.A.), the chairman of which is Mr. B. Keywood (secretary: Mr. H. A. Parrott). These affiliated manufacturers' associations will be housed at the C.M.A. Offices, High Holborn House, 52-54, High Holborn, London, W.C.1.

The C.M.A., as hitherto, will deal with research, standardization, testing and certification of its members' products, industrial relationships, education and training of personnel, co-operation with kindred associations and with subjects of a policy nature.

Mr. P. V. Hunter is the chairman of the C.M.A. for the current year, Mr. E. H. Wale has been appointed secretary on the retirement of Mr. W. G. Stiles, and as we have previously announced, Sir John Dalton has been appointed director of the Association on the retirement of Sir Thomas Purves.

Cable Production

Figures from 1946 Census

STATISTICS relating to the production of wires and cables and other equipment, secured in the partial Census of Production covering the year 1946, have been published by the Board of Trade.

The number of firms involved is not given but the average number of persons employed by them was 48,382 in 1946 as compared with 38,812 in 1937. Of a total value of production in 1946 of £53,458,000 (against £32,017,000 in 1937) cables and wires represented £38,485,000 net (£21,261,000 in 1937) and of these rubber insulated types were valued at £16,911,000 (£8,426,000), paper insulated at £11,231,000 (£10,824,000) and telegraph and telephone wires and cables at £4,965,000 (£5,088,000). The total quantity of copper wire drawn in 1946 was 82,200 tons, as compared with 78,600 tons in 1937 but the quantity of lead and lead alloys purchased was only 1,362,000 tons against 2,205,000 tons.

Exports in 1946 had a value (f.o.b.) of £10,799,000, against £4,397,000 in 1937. The principal items were paper-insulated cables, 27,158 tons valued at £2,599,000; non-submarine telegraph and telephone cables, 22,166 tons (£2,670,000); and rubber-insulated 14,815 tons (£2,943,000).

Other products of the same manufacturers are shown to have had a value of £13,794,000 in 1946 against £7,526,000 in 1937. Included in these were uninsulated copper wire, £2,558,000 (£2,522,000); copper wire rods, sections, sheets, strip, etc., and other manufactures of non-ferrous metals, £3,437,000 (£354,000); electric lighting appliances and fuses and fuse-gear, £1,322,000 (£187,000); joint boxes, £695,000 (£611,000); and contract work £2,046,000 (£2,111,000).

One table shows in detail the materials, fuel and electricity purchased. In 1946 159·6 million kWh was used against 101·4 million in 1937.

An analysis of employees and their remuneration shows that in 1946 male employees numbered 30,626 (against 27,819 in 1937) and female employees 17,756 (against 10,993). The total paid in wages and salaries was £12,636,000; the 1937 figures are not given.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Impregnating Plant

THE article in your issue of 30th July, under the above heading, rather seems to suggest that impregnation by any other than the vacuum and pressure systems is a "chancy" and somewhat doubtful proposition. I think that any such possible suggestion should be corrected.

In addition to an increasing range of modern wire coverings, which are in themselves non-hygroscopic, there are now available synthetic resin impregnating varnishes, having extraordinary penetrating properties, and the question of "little more than a surface treatment" can be ruled out completely.

So far as moisture removal is concerned, it is common practice to pre-heat jobs before impregnation, and during this period any moisture will be driven off. In addition, some of the synthetic varnishes referred to make use of solvents which are excellent moisture "carriers," so that if any trace of moisture is left after the pre-heat period it will be rapidly removed by the evaporation of the solvent during the early stages of the normal baking process. In fact, in certain types of work, this "carrier" action has been so effective that pre-heating has been dispensed with altogether, with excellent results.

I think it may be said, therefore, that by the use of suitable materials a result equal in every way to that produced by the vacuum process can be obtained by the non-vacuum method.

Brighton. L.E.S.

Artificial Three-Phase Systems

I HAVE read with interest the article in your 23rd July issue by Messrs. A. J. Baggott and N. F. Lowry on the running of isolated three-phase motors from single-phase mains with the aid of capacitors carefully chosen by tests with the motors.

Three-phase motors operated singly in this manner are in effect capacitor motors but without possessing the advantages and characteristics of properly designed capacitor motors. They are likely to suffer from a low overload capacity and thus give poor performance on fluctuating loads. There is also the risk of dangerously high voltages occurring during the run-up period when the capacitance is augmented for starting, unless the values have been chosen to limit the rise of voltage. This point is taken care of in properly designed capacitor motors.

The capacitor Ferraris-Arno system does not suffer from the above mentioned disadvantages, but where isolated motors are concerned, a properly designed capacitor or repulsion-induction motor should be used. The delivery position of such single-phase motors is now practically identical with that for three-phase motors and is much improved compared with the situation which no doubt prompted the authors to adopt the methods described in this article.

Rugby. A. H. MAGGS.

R.M.S. Value

"REFLECTOR," in your issue of 23rd July, does not state what sort of phenomena he had in mind when remarking on the use of the term "r.m.s. value." Surely the expression correctly applies to any phenomenon varying with time, however short its duration, which produces some effect proportional to its square. A phenomenon without a time factor has no value of any kind, and no new term is required.

Liverpool. F. G. HILYER.

Cyclometer and Dial Instruments

BROWSING through your issue of 18th April, 1947, I read "Sigmaphi's" article "Cyclometers or Pointers?" and it occurred to me that your readers might be interested to hear of some practical tests made with a view to determining the readability question. In the telephone operating business timing devices of various types are used for measuring the duration of trunk calls. Routine trunk service observers with stopwatches check the accuracy of the timing done by the trunk switchboard operators. Below is given a summary of the results of some 55,000 checks taken over a period of five years. The types of time measuring devices used are:—

(1) *Cyclometer Types.* (*a*) Five-figure display, representing 0-12 hours, 0-59 minutes and 0-9 tenths of minute. The operator reads the clock at the beginning and end of the call

and charges the difference. (*b*) Four-figure display, representing 0-12 minutes and 0-50 seconds. This clock starts from zero, the operator stopping the motion at end of call.

(2) *Dial Types.* (*a*) Calculograph clocks in which two clock face dials, giving 5-minute intervals and individual minutes, are printed on the trunk call ticket when inserted in a slot in the clock by the operator at the beginning and end of the call. (*b*) Automobile type clocks with an improved dial to assist the operator in reading the individual minutes.

In arriving at errors, over- and under-timing in excess of the tolerance allowed were summed for comparative purposes. The results were as follows:

Type of Clock	*Per cent Timing Error*
1a	0·8
2a	1·9
1b	2·0
2b	5·4

While these figures presumably will not apply exactly to the reading of electricity meter dials, the results may be of general interest. I should mention that I believe that the G.P.O. uses superior timing methods for trunk calls.

SOUTH AMERICAN TRUNK CALL.

Buenos Aires.

Recognition of Contractors

YOUR leader of 30th July with the above title prompts me to raise once more the matter of the registration of electrical contractors. Nobody can see the ultimate fate of contractors but as the British Electricity Authority has " loads " of work in hand to get the country's electricity supply in order, it is difficult to believe that it would also tackle contracting.

The attitude of the English Electrical Contractors' Association towards the National Register of Electrical Installation Contractors is also difficult to understand and although the principle of both bodies is the same that principle simply does not work out in practice. It is nonsense to infer that because firms are members of the E.C.A. their clients can be guaranteed good installation work. Under present conditions it is also incorrect to believe that even registered contractors all conform to the rules and regulations, although the N.R.E.I.C. does everything in its poor power to keep them " up to scratch."

The argument that English E.C.A. members do not see why they should pay two lots of fees does not hold water as the E.C.A. is principally a trade association, whereas the N.R.E.I.C. is an independent body with no trading interests. As the Government has unfortunately not seen its way to encourage the " ideal," namely compulsory registration, it is to be hoped that the English E.C.A. will yet see reason and advise its members to rejoin the N.R.E.I.C.

Even without compulsion the N.R.E.I.C. could be a powerful influence for good, if all reputable contractors gave it their backing and, with a sufficient number registered, the Government may be prevailed upon to recognize it.

Scotsmen are supposed to be mean but they, at all events, have not let the Register down.

Glasgow. A. MILNE, SENR.

Simple Network Solution

WHILE the method advocated by Mr. C. J. Mitchell in your issue of 6th August certainly applies in the case of a balanced cube, I do not think it can be applied when the resistances are all of different values.

If the distribution of voltage between opposite corners is considered, for each of the six alternative paths the sum of the voltage drops across the three resistances forming the path should equal the total voltage across the cube. Assuming, say, 10 V across the cube, the current in each resistance (using the value obtained by Mr. Mitchell) can be calculated. It will be found that the sum of the three IR drops for each path does not equal 10 V, thus proving that the value of 3·98 ohms obtained for the combined resistance is incorrect.

Brocton, Staffs. W. A. SNODGRASS, B.SC.

Technical Qualifications

I MUST thank " Chartered Electrical Engineer " for having cleared the air; had he seen the full text of my reply he would have realized how complete was the misapprehension.

Recognition of technical qualifications can only be accorded when a man passes certain defined steps; if one is omitted his other abilities do not matter (as I know to my cost, having sinned through necessity and ignorance in the early stages). The implications flowing from this cannot be solved readily, but a partial solution may be post-graduate courses on managership and/or commercial organization; perhaps his society

could give the lead. My own feeling is that engineers do not study other subjects, no doubt because of the size of the existing syllabus. Only recently a well qualified staff interviewer said how seldom they could claim to speak a specified language.

Our clubs and societies are a personal matter and should remain so, but I am always prepared to convince a prospective employer that my working ability does not suffer by such a "disadvantage."

Brighton. ELECTRICAL ENGINEER.

Steam Turbine Cycle

MR. B. WOOD'S comments on Mr. J. F. Field's proposed cycle appear to confirm my previous submissions.

Regarding the use of a gas producer in front of a gas turbine so as to utilize coal, I cannot agree that cost is a stumbling block since suitable equipment is available at about half the cost of equivalent boiler or air heater plant which it is intended to replace. Gas cleaning is, of course, essential; but as the quantity of gas to be cleaned for a given power output is only a very small fraction of the quantity of flue gas which now has to be cleaned in any event in an ordinary steam plant this should not present any difficulty on economic grounds.

As I have already indicated, there is every possibility of producing coal-fired gas producer-gas turbine plants at substantially less capital cost than equivalent steam plants. The gas producers and cleaning plants would be of standard construction, as now extensively used in industry, and there would be no need for high-pressure operation as suggested by Mr. Wood. The complete recovery of by-products is another matter, but at present interest rates can be shown to be an extremely attractive economic proposition, quite apart from the long-term policy of conserving national resources.

The general adoption of this new method of power generation would no doubt result in temporary dislocation in the boiler-making industry and, if history repeats itself with regard to such improvements, the method may not be adopted without a struggle on the part of powerful vested interests.

Leeds. E. HALLOWELL.

Norwegian Electric Welding Market

Possibilities for British Suppliers

IN a report on the market for electric welding equipment and arc welding electrodes in Norway, the First Secretary (Commercial), British Embassy, Oslo, states that local production of electric welding equipment is insufficient to meet the demand. Production of electrodes and electrode composition in 1944 (the last year for which statistics are available) amounted in value to kr. 4,667,878. At the present time the demand is abnormally high, and local production is unable to satisfy it, partly owing to shortage of wire, powders and chemicals.

No statistics are available of local production or imports of electric welding equipment, but figures are given of imports of arc welding electrodes. In 1947 the total value of welding electrodes and wire imported was valued at kr. 1,121,133, the United Kingdom being the principal supplier with kr. 460,895, Sweden coming second with kr. 273,985 and Belgium and Luxemburg sharing the third place with kr. 197,277.

Value of imports of electrodes for arc lamps, etc., was kr. 270,164, the bulk of which (kr. 154,928) came from France. The total value of graphite electrodes imported was kr. 823,105, Sweden being the chief supplier with kr. 476,075, the United States coming second with kr. 336,008. Of the total of kr. 1,505,220 of carbon electrodes imported during 1947, the United States supplied kr. 861,791, Canada kr. 397,639 and France kr. 229,971.

When the demand becomes normal Norwegian industry will almost certainly be able to satisfy the demand for electrodes. It is not anticipated, however, that the same will prove true for welding equipment as attempts to manufacture transformers, convertors, etc., have not been markedly successful and imports of such equipment will doubtless continue. United Kingdom prices are lower than Swiss and American, and British designs, though described as conservative from the technical performance point of view, are considered satisfactory.

Japanese Power Supply

IN a report by the Economic Adviser at the British Embassy, Tokyo, it is stated that the total hydro-electric and thermal generation in Japan during 1947 was 30,257 million kWh, which is nearly equal to the total for 1939, and is 85 per cent above the 1930-34 level. A plan has been formulated aiming at a total production of 33,000 million kWh for the fiscal year 1948-49, but the report states that this must be considered optimistic, since the increase in this short period (provided that there is a normally wet summer) depends upon stepping up the steam power generation, which in turn hinges on coal output.

NEW BOOKS

Electrical Horology : Frequency Analysis : Electronics

Electric Clocks. By S. J. Wise. Pp. 150; figs. 137; index. Heywood & Co., Ltd., Drury House, Russell Street, London, W.C.2. Price 10s. 6d.

The principles and working of systems in current use are described, the subject being covered in ten chapters. The first three are devoted to the elementary principles of electricity and of frequency control. Chapter four deals with some fifteen different types of battery driven and electrically wound clocks, followed by chapters on clock motors, synchronous clocks and turret clocks. The remaining three chapters cover the repair and maintenance of d.c. clocks, the repair of synchronous clocks and electric clock installation.

The many illustrations are very well prepared and do much to make clear a number of points, which, owing to the amount of ground covered, are not always fully, or clearly, described in the text.—S.F.P.

Frequency Analysis, Modulation and Noise. By Stanford Goldman. Pp. 434; figs. 178; index. McGraw-Hill Publishing Co., Ltd., Aldwych House, Aldwych, London, W.C.2. Price 36s.

This American book gives a mathematical treatment of its subject and is intended as a textbook for advanced students of radio engineering or a work of reference for the specialist. It deals with physical principles and practical applications, giving a most thorough treatment of Fourier series and Fourier integral analysis, together with a fairly detailed discussion on the theory of modulation and random noise. Most of the material has not previously been published in book form and some, which is the original work of Mr. Stanford Goldman, has not even appeared in periodical literature.—A.R.P.

A Text Book of Electronics. By J. M. A. Lenihan, M.SC. Pp. 211; figs. 151; index. English Universities Press, Ltd., St. Paul's House, Warwick Square, London, E.C.4. Price 12s. 6d.

This book is intended for students in physics and electrical engineering and for workers in other fields who wish to obtain some knowledge of the properties and construction of the electronic devices with which they may come into contact. The level of writing seems in fact to be suitable for those who can understand simple technical discussion provided there is an almost complete absence of mathematics, and would most likely therefore prove too elementary for the first class of reader.

After three chapters concerned briefly with fundamentals, discharge phenomena, thermionic and photo-electric emission and a.c. theory, there follow twelve chapters dealing with the properties of the more common devices such as valves, photo-electric cells and their uses for radio communication, induction and dielectric heating, electrotherapy and television. There are also chapters on the electron microscope and discharge tubes.

The writing and descriptions are clear and concise, but unfortunately not free from errors, some of which are very misleading, particularly in the chapter on discharge lamps. The printing, diagrams and the production generally are good, but there is an almost complete absence of references to suggested sources for more detailed reading.—V.J.F.

Speed Control of Electric Motors. Anonymous. Pp. 51; figs. 30. Emmott & Co., Ltd., 31, King Street West, Manchester. Price 2s. 6d.

No. 45 of the *Mechanical World* series, this pocket-size monograph, concisely differentiates between the characteristics of various kinds of machines, which are classified into 22 groups. The purpose is to indicate the limitations from the point of view of speed control of the several types for guidance in choice of drive.—W.O.F.

Radio Laboratory Handbook. By M. G. Scroggie. Pp. 430; figs. 170; index. For *Wireless World*, by Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 12s. 6d.

This fourth edition has been revised and enlarged to include recently developed laboratory techniques for v.h.f. work. There is also an appendix dealing with the M.K.S. system of units together with constructional information relating to bridges. Another new chapter contains miscellaneous useful information on such varied subjects as musical scales, decibels, wire gauges, etc.

Books Received

Calculation of Fault Currents in Electrical Networks (2nd Edition). By R. T. Lythall, M.I.E.E. Pp. 77; figs. 86; index. Sir Isaac Pitman & Sons, Ltd., Parker Street, Kingsway, London, W.C.2. Price 12s. 6d.

A Dictionary of Heavy Electrical Engineering (2nd Edition). By G. W. Stubbings, B.SC., F.INST.P., A.M.I.E.E. Pp. 225; figs. and index. E. & F. N. Spon, Ltd., 57, Haymarket, London, S.W.1. Price 10s. 6d.

Traffic Surveys: Practical Methods for Planners and Road Engineers. By R. B. Hounsfield, B.A.(CANTAB.), A.M.INST.C.E., A.M.INST.T. Published for *The Architect and Building News*, by Gilbert Wood & Co., Ltd., Dorset House, Stamford Street, London, S.E.1. Price 3s. 6d. (postage 2d.).

Radial Air-Gap Motors

Patent Literature and Contemporary Development

By C. RIDLEY

A TYPE of electric motor which has received little attention commercially in this country is the radial air-gap machine. In the United States, however, where over 20,000 of from ¼ to 10 h.p. are in service, it is known as the axial air-gap machine, since the magnetic lines of force follow a path parallel to the shaft (or axis of the motor) as compared with a radial path as taken by the magnetic flux in the conventional motor. For about half a century, inventors and experimenters have taken an interest in the system, and much technical information and some conclusions are available from patent literature.

An Early Design

As long ago as 1910 a British patent was taken out in the United States entitled "Improvements in High-Frequency Alternators," which utilized the radial air-gap system and was stated to give a larger output than had ordinarily been attainable hitherto from machines of this kind. One of the means was the ability to adjust and automatically maintain the air-gap by varying the operating conditions as in the operation of speed governors.

In this machine the laminated rings of the stator are clamped between the two containing rings and a solid magnetic inductor or rotor lies between these laminations. The field-coil magnetic circuit surrounds the coils and passes through the laminated rings and the periphery of the inductor. The magnetic air-gaps between the inductor and the laminated rings lie in radial planes. The periphery of the inductor is slotted radially so as to form magnetic poles opposite to the face of the laminated rings. High-tensile, non-magnetic wires fill the slots in the inductor periphery to avoid excessive windage at the high operating speeds. Ventilating holes are provided in the stator opposite the periphery of the inductor. Containing rings are screwed into the stator for axial adjustment of the air-gap.

The inductor shaft is long and flexible to allow the inductor, when up to speed, to revolve round its own centre of gravity. The main bearings are at a distance to permit of this self-adjustment, involving bending of the shaft. Other bearings are placed closer to the inductor, and are only in engagement with the inductor shaft while it passes through a critical speed in order to limit vibration.

To obtain good efficiency the air-gap should be small, and since it lies in radial planes, axial displacement of the inductor in running must be prevented. The novel arrangement of the distant bearings maintains the proper adjustment of the inductor, utilizing the thrust produced whenever the inductor departs from exactly midway between the laminated rings, by the increased magnetic pull of the reduced air-gap. The shaft is grooved to match the bearing sleeve, which is split for assembly. Thus the end thrust is taken by the grooves, and the self-aligning bearings permit of the shaft bending to suit the inductor self-centring requirements.

If the inductor moves slightly out of centre, the consequent difference between the air-gaps on its opposite sides results in a magnetic pull on the inductor in an axial direction which tends to move it still further out of position. This magnetic pull generates an end thrust on both bearings, producing heat and so slightly expanding the shaft length, which is thereby automatically restored to its central position. A later patent was taken out by the same appellant in 1918–19.

Water-Cooled Disc Motor

In 1918 a British patent was taken out by Thomas Preece for a disc-type motor, totally enclosed and water-cooled and giving an increased pole area over an ordinary air-cooled motor of equal size. The inventor's reasoning, as set out in the specification, was that the considerable waste in winding in the ordinary motor necessitated a large machine in order to obtain a large polar area. Further, the heat of the moving parts was transferred to the stationary parts, necessitating cooling by a series of ventilating gaps or faces. These were disadvantageous in a dusty position, and also raised the temperature of the surrounding atmosphere.

A motor of the disc type could be totally enclosed and provided with a water-jacket and an air-space, thus keeping it at an even temperature. The alteration of the air-space would also serve to alter the power or voltage. By suitable windings on the rotor disc and the adjacent stationary parts, the inventor

claimed that the efficient polar area could be increased by as much as 50 per cent.

To effect this a pulley is mounted with a comparatively narrow rim on which are secured metal strips wound to the depth desired. The side faces of the strip-built portion are then machined to form a series of slots and projections with a solid and narrow middle portion. The winding may be in the slots and around the centre.

The side casings surrounded by the water-cooled pocket are formed with annular projecting pieces corresponding to those on the rotor disc, and carry the windings. Above the rotor periphery and the poles of the stationary side members is a space. The casings, bolted together and enclosed, are adjustable as to distance apart to provide means for varying the air-gap between the fixed poles and the rotating armature.

Cycle Dynamo

Joseph Lucas, Ltd., built a radial air-gap dynamo in 1928–29, primarily for providing electric light on a pedal cycle. The rotor and stator were on the same axis alongside each other, the width of the air-gap between the adjoining magnet faces and the poles carrying the current windings being determined by an axial thrust bearing, preferably ball-shaped.

In one construction a number of short bar magnets carried by circular end-plates are arranged around and with their axes parallel to the longitudinal axis of the machine. The magnets may either form the stator, in which case the generating windings are mounted on the rotor, or vice versa. These windings are carried on pole pieces located similarly to the magnets which are attached to a circular plate made of magnetic material. The magnet end-plate remote from the windings is also made of magnetic material, but that adjacent to the windings is of non-magnetic material.

Rotor and stator are on a common axis, so that one end of each pole piece carrying a winding can co-operate in turn with one end of each of the magnets. For varying the air-gap between the pole and magnet ends, the inner end of the spindle carrying the rotor is adapted to bear against a thrust piece on the adjacent end of an adjustable stem carried by and on the axis of the magnet end-plate. The outer end of this stem is screw-threaded for engagement with a threaded aperture in the outer end plate and provided with a lock nut. Preferably a ball on one end of either of these parts takes the end thrust.

A long bearing for the rotor spindle is provided on one side of the rotor remote from the magnets, and the outer end of the spindle is fitted with a driving pulley or gearwheel. Enclosure of the rotor and stator is effected by a thin cylindrical cover, reduced at one end for attachment to the spindle bearing and provided at the other end with an end cover plate, the centre part of which is fitted with a detachable piece giving access to the interior. A current-collecting ring is combined with the end of the rotor remote from the magnets, a collecting brush being attached to a terminal on the cover end.

Speed and Torque Variation

A British patent was granted in 1929-31 to Jonni Zetsche and James Sinclair-Ross for "Improvements in and relating to the Regulation of the Speed of Electric Motors." The speed of electric motors of any output can be altered when the ends of the cores of the stator are interconnected magnetically by a closed ring while another iron ring interconnects the ends of the rotor cores. The torque can also be varied when the position of the rotor element can be shifted relatively to the stator. The patent provides means for varying the air-gap between the closed iron polar rings of the stator and rotor.

Taking for example a motor which normally operates vertically, the footstep bearing at the lower end of the rotor shaft is provided with a portion projecting through an opening in the motor casing co-axial with the rotor shaft. This opening is threaded to take a projecting bolt having a knurled head. By rotating the bolt, the relative positions of rotor and stator are varied so as to increase or reduce the air-gap between their two closed iron rings.

Increasing the air-gap raises the speed promptly and reduces the torque; on the other hand, reducing the air-gap lowers the speed and increases the torque, the power of the motor remaining constant in either case. An indicator may be connected to show the percentage variation in speed from a predetermined setting.

Frank Whittle (of jet-engine fame) was granted a patent in 1935-36 for the application of air-gap control to mechanisms covering a wide field, including motor vehicles, machine tools and auxiliary drives; one application replaced the flywheel clutch and gearbox of an automobile. This patent is not limited to

the radial air-gap, but it embodies the principle of variation.

While the invention may be used instead of a rheostat for varying the characteristics of any dynamo or motor, it seeks primarily to alter speed independently of the driving mechanism, as the load requires.

The field flux of electrical machines can be altered by mechanical adjustment of the air-gap volume; i.e. by varying the volume of the space traversed by field flux in those parts of the magnetic circuit not occupied by material of high permeability. One unit of a machine revolves within another, which can be moved axially. Alternatively, the pole pieces of the field magnet system, whether rotating or stationary, move in a radial direction.

In machines having crosswise pole pieces with armature windings mainly in the plane of rotation, a small axial movement of the stationary component will produce a large difference in the air-gap volume.

Variation of field flux may be used in connection with a dynamo or a motor only, but an increase of air-gap volume of a dynamo can accompany a simultaneous decrease in the air-gap volume of the motor or vice versa.

Motor-Vehicle Application

In one form relating to the transmission of power on motor vehicles, armatures are carried by the primary and secondary drive shafts, while a non-rotative field magnet system supplies the field flux passing through both armatures. The three components are co-axial and their windings are preferably in series.

The field magnet system is mounted on a framework capable of easy axial movement to give an increase of the total flux passing through one armature, and a decrease in the other case.

Where driven by a petrol engine, a speed governor controls the axial position of the field-magnet system so that the speed of the engine is kept constant for any governor setting. The dynamo can act as a starter motor, and its windings can be tapped to supply current for battery charging; it may also act as an auxiliary electric brake.

In British patent 558222 granted to the Ford Motor Co. the armature and field cores are constructed by a spirally winding a thin, narrow strip of electrical steel to build up a laminated ring. The armature windings are placed in thirty-five spaced, radially disposed slots and the field windings in eight slots which form pole pieces. The leads from the armature windings are connected with segments of a commutator carried on the rotor.

An integral circular channel on the rotor and a removable circular channel on the stator receive the core pieces which are riveted on. The shaft contains a shoulder which regulates the air-gap between the core pieces. The right-hand end of the rotor assembly, in conjunction with the shoulder on the shaft, acts as a spacing device for regulating the air-gap between the two cores.

The design permits the construction of a thin flat machine without sacrifice of electrical capacity and provides a close adjustment of the air-gap and a rotor structure which supports the windings fully, without straining them. The machine-made cores lend themselves to automatic, continuous manufacture.

Information at present available on the American technical developments is that these are suitable for horizontal or vertical flange mounting or on an angle base for V-belt drives.

Outstanding features are that the size of this type of motor is less than half that of the conventional machine and that it weighs 30 per cent less, while retaining all the characteristics of sturdiness and power requirements. It is simple to clean and lubricate and runs cooler, while the overhang as a flange motor for machine tools is much reduced. The length of the motors is about one half, with only slightly increased diameter.

"Circulaire Periodique"

A WIDE variety of economic and statistical information is contained in the current number of "Circulaire Periodique," the quarterly journal of the International Union of Producers and Distributors of Electrical Energy, Paris. The issue which is now available from the Union Offices, 12, Place des Etats-Unis, Paris, 16, is the third to be published since the journal was restarted after the end of the war. The subscription is 500 French francs per annum. Published in French, the contents include articles on electricity production and consumption in Belgium last year; production and distribution in Canada during 1945 and in Denmark 1945-46; the war's effect on the Chinese industry; Swedish and Italian development problems; the situation of the industry in Russia; the Grande-Dixence project in Switzerland; the 1947 report of the Central Electricity Board; and electrical distribution in Liverpool.

Voltage Regulators

TRANSFORMERS INCORPORATING MOVING COILS

DEPRESSION of voltage by increasing load on power transmission cables and overhead distribution lines can be compensated for by the use of automatic regulators, either separately installed or associated with the transformers in some of the available kinds of on-load tap-changing gear. All mechanical and most electromagnetic complications are claimed by Ferranti, Ltd., to be avoided by substituting a form of moving coil for the tap-changer.

Tappings for the full required range of voltage variation only are brought out from the transformer winding and connected to the two fixed coils of a regulator. They and the isolated and short-circuited moving coil only are required, the usual boosting and bucking coils being unnecessary. When the moving coil is at one end of its travel (Fig. 1) the impedance of coil (*a*) is practically zero and tappings 1 and 4 are virtually connected. Similarly at the other end of the travel tappings 2 and 3 are virtually connected. The regulator gives a smooth variation of voltage over the range covered by the tapping limits.

There are thus no tappings to change, no switches or mechanism for sequence operation, no associated control and protective gear, no maintenance of contacts. The regulator has, however, both iron and copper losses as in the main transformer though much smaller in magnitude and they may all be considered together. The extra losses due to on-load tap-change gear are in general lower and, in some cases, negligible. The moving coil regulator is installed in the same tank as the transformer (Fig. 2), usually at one end.

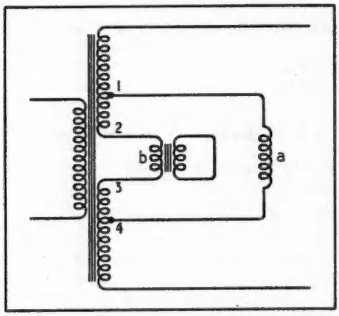


Fig. 1.—Combination transformer regulator windings

The mechanical operation and automatic control are the same as for the standard moving coil regulator. The operating motor is of the induction disc type with a plain copper disc rotor so that the motor and the whole of the mechanism are oil immersed and thus lubricated and protected from dirt and the atmosphere.

The motor starting and stalled currents are practically the same as the full load running current; thus there is no need for special starting features, limit switches or overload devices. The low weight and low speed of the rotor reduce the inertia so that no brakes are needed to prevent over-running. Since starting and stopping stresses are absent, there is no need to limit the frequency of operation so the usual time delay relays can be omitted. The voltage control relay is of the " astatic " type with a power/sensitivity ratio sufficient to operate a mercury switch instead of light open contacts while there are no hold-on devices, control springs, or sliding bearings. The mercury switch is the only contact maker in the whole equipment.

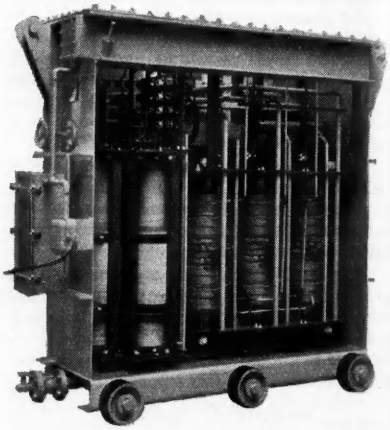


Fig. 2.—Three-phase, 500-kVA, 11,000/415-V, moving coil regulated transformer

Electricity Output

THE output of solid-fuel fired stations in Great Britain during the week ended 30th July was 584 million kWh. This compares with 676·6 million kWh in the preceding week and 533·9 million kWh in the corresponding period of 1947. Stocks of coal at power stations totalled 4,013,000 tons (equal to 5·7 winter weeks' supply) at 24th July against 3,404,000 tons (4·8 weeks' supply) at 26th July, 1947.

COMMERCE and INDUSTRY

Electrical Machinery Deliveries.

THE Monthly Digest of Statistics (H.M. Stationery Office, 2s. 6d.) shows that of the monthly average of 42,300 kW of steam turbines of less than 10,000 kW delivered in the first quarter of this year, 33,300 kW was for export. The figures for the corresponding period of last year were respectively 9,700 kW and 6,700 kW. The monthly average total value of rotating electrical machinery was £1,612,000 (£732,000 for the first quarter of 1947), of which £227,000 (£142,000) was for export. Of fractional-h.p. motors valued at £588,000 (£294,000), £79,000 (£75,000) worth was for export.

Greyhound Track Lighting

A new blended lighting scheme has been installed at the greyhound track, Taunton. The floodlights were specially designed by the Brighton Lighting & Electrical Engineering Co., Ltd., and for each unit Philips Electrical, Ltd., supplied two 500-W tungsten and one MA/V 400-W mercury lamps and the apparatus for the latter. The installation was supervised by F. J. Lock and C. M. Pascoe, of Taunton. Thirty-six units are installed, 36 to 40 ft apart and mounted 18 ft high. This results in high-intensity illumination with a daylight effect and an economic consumption. A similar scheme has been installed at Exeter.

Section of Taunton greyhound track lighted by Philips tungsten and mercury lamps

Conditions in Peru

A review of commercial conditions in Peru which has been issued by the Export Promotion Department (H.M. Stationery Office, 9d.) points out that the extent of the country's imports is now more than ever dependent on her capacity to pay for them. Out of the total population of 7½ million, fewer than one million are potential buyers of any but the cheapest imported articles. United Kingdom goods have always been very popular due to their quality and durability, although in recent years price considerations have often reacted in favour of cheaper goods from other sources. In 1938 electrical apparatus to the value of £39,000 was imported from the United Kingdom, representing 7·8 per cent of the country's total imports of this class of goods.

Congress of Mechanical Engineering

A brochure detailing the programme of papers to be read at the Congres International des Fabrications Mécaniques and of the works visits arranged in the Paris area is now available on application to the Publications Division, British Engineers' Association, 32, Victoria Street, London, S.W.1. Information is also given of three "study-tours" arranged to the machine-tool factories at Chateaudun; to the Compagnie Fives-Lille; and to works at Graffenstaden, Belfort, Grenoble and the Genissiat power plant. The last mentioned tour provides for a visit to the French Machine Tool & Engineering Fair at Basle.

Teachers' Housecraft Course.

West African Radio Relay Station

A twin-programme radio relay station at Accra on the Gold Coast has been designed and supplied by the General Electric Co., Ltd. It replaces an older single-programme G.E.C. equipment and will operate over the existing distribution network as a single-programme unit until a second set of lines has been erected. For normal working the equipment consists of four standard G.E.C. 500-W amplifiers with a similar amplifier as spare. These are arranged to supply a number of output feeders operating at voltages up to 300 and connected to the main trunk lines; transformers step down the programme to 50 V for local distribution. Full control facilities are provided, including signalling into the studios, mixing and fading of all inputs, together with visual and aural monitoring at the control racks. The programmes are also fed to low power radio transmitters for local broadcasting.

X-ray Film Sizes

Minimum and maximum cutting sizes for X-ray film and intensifying screens as well as a minimum size of cassettes have been standardized by the issue of BS. 1443, which provides for ten inch sizes and six metric sizes, the latter to satisfy the needs of foreign markets. These

sixteen sizes will replace more than thirty formerly used in this country for medical and industrial radiology. The new specification is obtainable for 2s. from the British Standards Institution, 24, Victoria Street, S.W.1.

Rubber Production and Consumption

Advance statistics of the international rubber situation during the first half of this year show a total production of natural rubber of 727,500 long tons and a consumption of 667,500 tons. Stocks available to industry at the end of June remained at 850,000 tons. Synthetic rubber production amounted to 272,500 tons during the half-year and consumption to 245,000 tons. There was a rise in stocks of the material to 102,500 tons.

Section of the S.E. Electricity Board's display at the Coulsdon Careers Exhibition

Tax on Electric Blankets

The Inland Revenue authorities recently decided that warming pads and blankets were not electrical appliances but " soft furnishings " and therefore subject to 66⅔ (instead of 33⅓) per cent purchase tax. Manufacturers have protested but have been unable to secure any modification of the ruling.

Electrical Housecraft for Teachers

Teachers from all over the country will assemble at the London headquarters of the Electrical Association for Women on 12th and 13th November for a special two-day course on the teaching of electrical housecraft in schools and colleges. The course will include lectures on such subjects as the use and misuse of electrical appliances, with practical demonstrations; the selection and use of large scale equipment; practical work in the science department; the peak load in relation to the work of the teacher and a lecture-demonstration on fluorescent lighting, as well as a discussion on the help which the electrical industry can give to teachers. Programmes and application forms will be available shortly from the Association, 35, Grosvenor Place, London, S.W.1. Applications to attend must be received not later than 22nd October.

Careers Exhibition

A Careers Exhibition sponsored by the Coulsdon Rotary Club was held on 24th and 26th July in the Smitham Schools, Chipstead Valley Road, Coulsdon. The South Eastern Electricity Board staged an exhibit to show parents and young people something of the work embraced by the electrical industry. The accompanying picture depicts the centre-piece of the exhibit and leading up to it were 16-ft display panels which gave general information on generation, distribution, manufacturing and research. A comprehensive file of booklets describing manufacturers' training schemes for technical school apprentices and college graduates was made available. W. T. Henley's Telegraph Works Co., Ltd., and Hoover, Ltd., provided display stands which demonstrated typical examples of such schemes. The British Electricity Authority's new training course in generation and distribution for graduate engineers together with the existing arrangements already taken over from certain municipalities were incorporated.

Careers for girls were not ignored. There were photographic examples of their employment in works and research laboratories, and two avenues of employment within the Board were demonstrated, viz., accounting machine operation and housecraft advisory service. The Electrical Association for Women provided a stand to advise on such careers and attention to this feature was attracted by a display of Jackson cookers dating from 1913 to the latest 1948 streamlined thermostatically controlled model.

The whole exhibit was rounded off by examples of the work of such skilled tradesmen as plumbers, jointers, meter testers, electricians and hot water engineers.

Floodlighting for Olympic Yachting Week

During the Olympic Yachting Week at Torquay the Minister of Fuel and Power gave permission for the B.T.H. floodlighting along the Rock Walk to be switched on. At the end of the war the Torquay Corporation completely overhauled this floodlighting, and lamps and other equipment were purchased to replace outworn parts. A total of forty-eight "Mazdalux"

floodlight projectors, using " Mazda " mercury vapour discharge, gas-filled projector and filament lamps were installed by the British Thomson-Houston Co., Ltd., in April, 1938, and except for replacements and certain additions, the same equipment was used for the period of the Olympic races.

Useful Pocket Book

It is announced that the fifth edition of the pocket book compiled by Musgrave & Co., Ltd., St. Ann's Works, Belfast, is now obtainable price 10s. 6d. Within its 112 pages this handy little book contains a wealth of data which, besides being of use to heating and ventilating engineers, with particular reference to the company's products, provides an invaluable pocket reference for engineers of all kinds.

" Murex Review "

The first issue of the " Murex Review," to be published quarterly, contains an illustrated article on the uses of stainless steel in the chemical and food processing industries with a shorter contribution on vanadium, tungsten and molybdenum in the colour industries. The last two pages containing abstracts. The contents are intended to interest users of special metals and other products of Murex, Ltd.

N.E.I. Customs Concession

The Netherlands East Indies authorities, in accordance with their policy of assisting the rehabilitation of estates and local industry, announce their readiness to consider the reduction by 50 per cent of import duties on a number of classes of goods. A list published in the *Board of Trade Journal* of 7th August shows that many electrical classes are included in this concession.

Goods Transport by Air

The advantages of the use of charter aircraft for the transport of goods at home and for export are set out in a letter received from E. A. Gibson & Co., Ltd., Cunard House, Leadenhall Street, E.C.3. It is mentioned that loads from a few hundredweights to 8 tons can be carried, with space up to 2,000 cu ft. Often it is possible to group small consignments to relieve the sender of the expense of chartering an entire aircraft. Transport of goods by air enables light packing to be used, handling (and consequently pilferage) is minimized, insurance premiums are lower and the risk of damage is slight.

Electrical Laboratory Equipment

Rectifier equipment of modern design, supplied by the General Electric Co., Ltd., has recently been installed in the engineering laboratory of the Granville Technical College in Sydney, New South Wales. It is of the six-phase pumpless steel-clad air-cooled type, incorporating several features of unusual interest so as to afford the maximum educational benefit. Apart from functioning with or without grid control it can be used as an invertor up to full-load capacity. The grid control gear starts automatically from the main start push-button and provides full control of output voltage down to zero, adjustment being made by means of a phase shifting transformer actuated by a handwheel on the main panel. In order to facilitate current and voltage measurements all important connections are readily accessible and links are provided so that auxiliary apparatus can be disconnected when not required. The installation, which is designed to operate in an ambient temperature of 104 deg F from 415-V, 3-phase 50 c/s mains, has a full-load output of 100 kW at 240 V d.c., and comprises a main transformer, d.c. and a.c. switchboards, together with a sheet steel cubicle which houses the rectifier bulb and associated control gear.

Wembley Stadium Lighting

Many of the sporting events held at Wembley —scene of this month's Olympic Games—are of necessity held after dark, and for years the Metropolitan-Vickers Electrical Co., Ltd., has co-operated with the Stadium engineers to provide the special illumination demanded by each event. The lighting of the greyhound and speedway racing track within the Stadium has been recently overhauled. The main stands are illuminated by a series of 500-W and 750-W totally enclosed prismatic reflectors and for the terraces in front of the stands a system of 1,500-W open type floodlights is installed high up at the front of the two stands. Similar open-type floodlights are mounted on poles at the top of the east and west terraces in order to provide adequate movement and safety lighting. The movement and circulating areas are equipped with 200-W and 500-W refractor street lighting lanterns, and the external exits and staircases are illuminated by 1,000-W open-type floodlights. At the Empire Pool the main lighting comprises four banks of 15 concentrating type high-bay units mounted 42 ft above floor level. In each bank there is a proportion of 400-W " Metrovick " mercury discharge lamps which, together with 1,000/1,500-W " Cosmos " metal filament lamps, provide effective lighting akin to natural daylight. Additional special lighting has been provided for various functions.

Window Display Competition

Prizes amounting to £250 (first prize £100) are offered by E. K. Cole, Ltd., to " Ekco " dealers for the best window displays during August advertising the company's " Princess " portable radio receiver.

Indian Inquiries

The Export Department of the Board of Trade states that East End (India), Ltd., 35,

Chittaranjan Avenue (South), Calcutta, is anxious to obtain supplies of double- and triple-pole switch-fuses (15 and 30 A at 250 V and 30- 200 A at 500 V respectively) and various automatic circuit breakers and contactor switches. The company holds an import licence to the value of £37,500.

The Department has been approached by Chaturbhuj Jivandas & Co., Kanji Gokaldas Building, 158, Lohar Chawl, Bombay, for assistance in contacting United Kingdom manufacturers of certain commodities with a view to obtaining agencies on a commission basis.

The list of goods includes the following:—Vacuum cleaners, electric floor polishers, electric motors (fractional and integral h.p.), air conditioning units, electric water heaters, and refrigerators. Manufacturers interested are asked to inform the Department (Room 1103, Thames House North) of any action taken.

New B.B.C. Transmitter

The British Broadcasting Corporation has obtained a site for a new transmitting station near Norwich, and construction has begun. The new station will supersede the existing 1-kW transmitting station in Norwich and will radiate the Midland Home Service programme with a power of 5 kW on 296·2 metres (1013 kc/s), giving improved reception in the Norwich area. A directional aerial system will be used consisting of two mast radiators, each 126 ft. high. It is not yet possible to say when the station will go into service.

Sealing Porous Castings

Appreciable money and time are often lost when castings have to be rejected because pressure tests have proved them to be porous. Such wastage can be avoided by vacuum impregnation with resin, which fills up the pores (not holes) and seals them when hardened. The Pulsometer Engineering Co., Ltd., Nine Elms Iron Works, Reading, is prepared to process casings in this way and to supply impregnating plant for this purpose.

Indian Electrical Manufacture

A three-year plan for the development of certain industries has been announced by the Government of India. It will be achieved partly by direct State participation and partly by encouraging and assisting private enterprise. Among the industries included in the plan are those concerned with transformer and motor manufacture.

It is stated that the 1947 productive capacity for transformers was 102,000 kVA and it is proposed to raise this to 177,000 kVA by 1950; a further expansion to 250,000 kVA in the next five years is envisaged. The present capacity for producing three-phase squirrel cage motors of from 1 to 30 h.p. is said to be 100,000 h.p. per annum. The immediate aim is to increase this to 250,000 h.p. About 600 fractional h.p. motors are at present produced yearly and it is hoped to raise the figure to 25,000 by 1950.

The Export Promotion Department of the Board of Trade says that although the erection of new factories is progressing the position with regard to the supply of raw materials is doubtful as India will have to rely almost entirely upon imports during the next three years.

Educational

A special course of twenty lectures on the design and operation of fuel-fired furnaces, with special reference to recent developments, will be given at the Northampton Polytechnic, St. John Street, E.C.1, on Tuesday evenings, commencing on 5th October. On Wednesday evenings, commencing on 6th October, a special course of ten lectures will be given on the technology of refractory materials. Particulars of these courses can be obtained from Dr. J. E. Garside, Head of the Department of Applied Chemistry.

Enrolment commences at the South-East London Technical College on 20th September for the National Certificate and City and Guilds courses in electrical engineering, telecommunication engineering and applied physics. In addition there are a number of special courses in electrical engineering subjects. Particulars can be obtained from the Head of the Electrical Engineering Department at the College, Lewisham Way, S.E.4.

Trade Announcements

The Newcastle branch of the **Z Electric Lamp & Supplies Co., Ltd.,** is removing on 16th August to 105, New Bridge Street, Newcastle-on-Tyne. The telephone number remains unchanged.

The Patent Department of the **Metropolitan-Vickers Electrical Co., Ltd.,** is now at 162, Shaftesbury Avenue, London, W.C.2 (telephone: Temple Bar 3822; telegrams: " Metropat," Westcent, London).

Trade Publications

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—Catalogue of lighting fittings for hospitals, sanatoria and nursing homes.

Lancashire Dynamo & Crypto Ltd., Trafford Park, Manchester.—Catalogue of flameproof motors.

Revo Electric Co., Ltd., Tipton, Staffs.—Five priced leaflets illustrating fluorescent lighting fittings and a brochure surveying the various Revo factories.

The Morgan Crucible Co., Ltd., Battersea Works, Battersea Church Road, London, S.W.11.—Leaflet illustrating carbon current collectors for cranes and other industrial machinery.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

Scottish Cables, Ltd., held its annual meeting recently. In a statement issued with the report and accounts, Mr. W. Fraser (chairman) says that at the present time the company has a record number of orders on hand. The excellent performance of their super-tension (33,000 V) cables installed in various parts of the world has resulted in a rapidly increasing volume of orders for this section of their business, and recently they have received their largest individual order for 33,000 V cables, amounting to approximately £230,000. There is a steady increase in their overseas business which now forms a large proportion of their productive output, and they are now continuously engaged in the supply of their various products and the executing of large cable contracts for nearly all the important countries and centres throughout the world.

Greenwood & Batley, Ltd.—In the course of his speech at the recent annual meeting, Col. H. A. Micklem (chairman) said that all departments of the works, with the exception of the small arms ammunition factory, had been operating during the year under review at as full capacity as the available skilled and other labour would permit. Sales had shown a considerable improvement over the previous year. A considerable part of their total output was for export, and there was no appreciable falling off in the volume of orders, although they were somewhat apprehensive as to the effect on their foreign purchasers of the upward trend of costs.

Richardsons Westgarth & Co., Ltd., report a trading profit for the year ended 31st March last of £482,854, as compared with £472,241 for the preceding year, plus other income making £488,403, and a net profit of £161,981 (against £127,419). As already announced the distribution for the year is 10 per cent, including 2 per cent, not subject to tax, from capital reserve account. Last year a dividend of 10 per cent was paid. The balance carried forward is £60,913 (against £53,644 brought in).

In his statement which has been issued with the report and accounts, Lt.-Col. H. M. Stobart (chairman) says that the company has an order book in the region of £17,000,000, as compared with £12,000,000 a year ago. Of current orders, 71 per cent represents marine work and 29 per cent land work, with 63 per cent of the marine work comprising orders for export.

The Oriental Telephone & Electric Co., Ltd., in a preliminary statement, shows a net revenue for 1947 of £110,621, as compared with £53,627 for 1946. It is proposed to pay a final ordinary dividend of 12 per cent (against 6 per cent), making 16 per cent, less tax, for the year (against 10 per cent). A sum of £20,000 is placed to taxation reserve, and the balance carried forward is £72,459 (against £73,070 brought in).

Venner Time Switches, Ltd., show a balance of £19,452 on profit and loss account for 1947, against £7,315 for 1946. After meeting taxation and 8 per cent preference dividend, it is proposed to pay an ordinary dividend of 5 per cent (against nil) and to carry forward £22,804 (£18,584).

The Rothermel Corporation, Ltd., reports a net profit, after taxation, of £41,908 for 1947, as compared with £26,814 for the preceding year. It is proposed to pay a final dividend of 22½ per cent (same), making with the interim dividend a total of 40 per cent, less tax, for the year (against 35 per cent).

The Greengate & Irwell Rubber Co., Ltd., has has declared an interim dividend of 7 13/16 per cent (unchanged).

Electricity Dividends

The British Electricity Authority has issued a statement about the distribution of final dividends and interest to stockholders and shareholders in electricity companies under Section 27 of the Electricity Act, 1947 in which it states that so far in respect of only a very few cases has it received auditors' certificates of the amounts payable. It has, however, had a number of applications for payment on account and these are being approved as soon as practicable on the Authority's having reasonable evidence that there has been sufficient net revenue to cover the advance. A number of such advances have already been approved and made. In a small number of cases the evidence is under examination, and in a few instances further information is needed. In many cases no application has yet been received.

The distribution of any payment on account is in the hands of the stockholders' representative, and the amount distributable by him to the various stockholders depends on the facts relating to the particular securities.

It has not been questioned that the extra day arising in leap year should be taken into account wherever appropriate.

New Companies

Cayson Electrics, Ltd.—Registered 20th July. Capital, £20,000. Manufacturers of electrical and control gear, transformers, discharge lighting chokes, switches, etc. Directors: J. Krimholtz, M. Krimholtz, R. Kay and A. J. Crawley. Regd. office: 139, Queen's Road, Watford, Herts.

Haylesbury Winding Co., Ltd.—Registered 24th July. Capital, £100. To carry on the

business of electrical winding; and manufacturers of, and dealers in, dynamos, armatures, etc. Directors: H. R. S. Brown and Edith H. Brown, both of 4, Manor Way, Colindale, N.W.9. Secretary: Edith H. Brown. Regd. office: 430, Strand, W.C.2.

Arnold Montrose, Ltd.—Registered 31st July. Capital, £1,000. Wholesalers, manufacturers, assemblers and repairers of electrical goods and fittings, etc. Directors: P. Shaw (director of Philip Shaw (Contractors), Ltd.) and M. Kaufman. Secretary: L. Litkin. Regd. office: 172, Bishopsgate, E.C.2.

Kelly & Shiel (Ekco Products), Ltd.—Registered in Dublin 27th July. Capital, £15,000. Manufacturers of, and dealers in, radio, radar, television, telecommunication and electrical apparatus. Subscribers: J. K. Maconchy, A. O. Shiel, G. T. Kelly and N. C. Robertson.

Haddon Transformers, Ltd.—Registered 28th July. Capital, £500. Manufacturers of, and dealers in, all types of electric transformers, etc. Directors: E. J. Haddon and Jean A. Cooper. Secretary: E. D. Jones. Regd. office: 32, Cowbridge Road, Kenton, Middlesex.

R. F. Development Co., Ltd.—Registered 27th July. Capital, £5,000. Manufacturers of, dealers in, and repairers and hirers of, radio-frequency welding machines (for welding, sealing and unifying all plastic and other like materials), electrical and mechanical apparatus accessories and components. Subscribers: V. de Courcy Dashwood and F. J. Collins. Secretary: B. Avens. Regd. office: 4, High Street, Olney, Bucks.

Increases of Capital

Norman Oade, Ltd.—Increased by £1,000, in £1 ordinary shares, beyond the registered capital of £1,000.

Powerlite Electrical Installations, Ltd.—Increased by £3,000, in 333 "A" 1¼ per cent cumulative preference and 2,667 "B" 1¼ per cent redeemable cumulatve preference shares of £1 each, beyond the registered capital of £1,000.

Conroy & Owen, Ltd.—Increased by £3,000, in £1 ordinary shares, beyond the registered capital of £2,000.

Edison Swan Electric Co., Ltd.—Increased by £367,434 12s. in 1,837,173 ordinary shares of 4s. each, beyond the registered capital of £632,565 8s. By resolution dated 12th July, 2,500,000 ordinary shares of 4s. each were consolidated and divided into 500,000 ordinary shares of £1 each.

Bankruptcies

W. J. Griffin, residing at Torbay, James Street, Earl Shilton, Leicestershire, and carrying on business at 2, Hinckley Road, Earl Shilton, radio and electrical dealer.—Receiving order made 30th July, 1948, on debtor's own petition. First meeting, 13th August, at the Official Receiver's Office, 1, Berridge Street, Leicester. Public examination, 8th October, at The Castle, Leicester.

Mrs. R. F. R. Butt, radio and electrical dealer, lately carrying on business at 12, Bouverie Road, West, Folkestone.—Trustee, Mr. A. M. Lander, 1, The Parade, Canterbury, Official Receiver, released 29th July, 1948.

J. H. Christopher, electrical engineer, 54, Saville Street and Suez Street, North Shields.—Trustee, Mr. A. K. Ferguson, Gibb Chambers, Westgate Road, Newcastle-upon-Tyne, released 29th July, 1948.

E. N. Belsten, electrical contractor, residing and carrying on business at 245, Highters Heath Lane, Warstock, Birmingham.—Last day for receiving proofs for dividend 18th August. Trustee, Mr. R. K. Clark, Somerset House, 37, Temple Street, Birmingham, 2, Official Receiver.

D. J. Hope, radio and electrical engineer, residing and carrying on business at 6, Sunnyside Road, Wyke Regis, Weymouth, Dorset.—First meeting held 10th August at Official Receiver's Office, 52, Fisherton Street, Salisbury. Public examination 15th October at the County Hall, Dorchester.

Liquidations

Union Cable Co., Ltd.—Members' voluntary winding-up. Particulars of claims to the liquidator, Mr. C. H. I. Chown, Pinners Hall, London, E.C.2, by 30th September. (All creditors have been or will be paid in full).

Meeting of Creditors

Kamba Electric, Ltd.—A meeting of creditors will be held on 27th August at the offices of A. E. Attwood & Co., 90, Queen Street, London, E.C.4.

Codes of Practice

TWO more Codes have been circulated in draft form for comment. Sub-code 327.403 is concerned with the installation of impulse clocks and timing systems on various kinds of premises. The principal types available are described and their particular uses explained to aid proper selection; system layout and methods of circuiting, wiring and cabling are dealt with. Sub-code 402.501 deals in a similar manner with the installation of electrical fire alarms, including call points and detectors, but excluding public systems and those associated with automatic sprinklers.

U.S. Subsidy for Insulation

The U.S. Department of Agriculture is to continue to subsidize the manufacture of insulating material from low-grade cotton for another year. The subsidy rate will be 4½ cents a pound, gross weight, on cotton used, 1½ cents less than last year.

STOCKS and SHARES

THE principal feature of Stock Exchange markets is the steadiness with which prices hold their ground in the face of handicaps which might have been expected to exercise a depressing influence over investment in stocks and shares. The firmness of the gilt-edged market, noticeable more particularly in British Electricity 3 per cents at 101, and in British Transport threes at 97¾, serves as a useful prop to other departments. It helps to encourage a confidence in them which, otherwise, might be lacking were there to be pronounced weakness in British Government securities.

Markets Recover

Business in most markets is extremely limited, as, indeed, is usually the case at this time of year. Profit statements are mostly good, though the dividend limitation, voluntarily observed by so many companies, removes the ordinary incentive to hopefulness in regard to increased dividend payments. After the long and lugubrious list of falls shown in our price lists last week, it is refreshing to record a better tendency. Where movements in prices have occurred, they have been mostly in the upward direction.

Majority of Rises

British Electric Traction deferred stock shows the chief change. The price, at 1,665, is 30 points up on the week. Cable & Wireless ordinary at 195 is 9½ points higher. Rises of 2s. 6d. lifted Victoria Falls to 7⅛, Aron to 50s. and Anglo-Portuguese Telephone to 33s. 9d. English Electrics, 45s. 9d., Henley's 24s., H. J. Baldwin 9s. 9d. and British Rola 1s. 3d. are all better. General Electrics hardened to 82s. 6d., Lancashire Dynamo to 98s. 9d., and Tube Investments to 6 1/16. Crompton Parkinsons at 25s. are 1s. up. Falls are few in number and of little consequence with the exception of Associated British Engineering, the price of which has fallen 7s. 6d. to 32s. 6d. A seller came into the market and, in the absence of public demand, the effect was disproportionate to the number of shares involved. International "Tel. & Tel." at 21 suffered a fall of $3, owing to the weakness of the New York Stock Exchange during the past few days. Marconi Marine went back to 31s. 3d.

Electric Construction

A noticeably good yield in the electrical equipment list is the return of £5 4s. 6d. per cent on Electric Construction £1 ordinary, which have remained at about 48s. 6d. since the appearance of the good profits statement at the end of July. Net profits, before tax, increased during the year by 78 per cent. Higher taxation absorbed much of the increase, but left earnings of over 20 per cent to cover the maintenance of the dividend at 12½ per cent for the sixth successive year. In the balance sheet, the general reserve of £300,000 equals the ordinary share capital, and a further £30,000 is held in reserve also as a dividend equalization fund.

Doubled Profits

Oriental Telephone & Electric shares, which have been an active market for some weeks in anticipation of the figures for 1947, were galvanized into a sudden leap of 7s. to 52s. on the doubling of the final dividend, and have since advanced further to about 57s. 6d. Operating telephone services in Singapore and further east, the company was generally recognized as possessing the qualifications of a special case in relation to dividend limitation; and last year's increase in the dividend to 10 per cent, from the wartime level of 4 per cent, had signalled the beginning of active recovery in Singapore and elsewhere. Nevertheless, the market was taken agreeably by surprise by the restoration of the rate to the 1940 level of 16 per cent. Net profits are provisionally stated to be about twice those of last year. The yield on the shares works out now at £5 11s. 4d. per cent. Exceptionally large liquid resources were a feature of the last balance sheet.

Radio News

Dividend limitation intervened between Rothermel Corporation's interim and final distributions. Having raised the former by 5 per cent, to 17½ per cent, the final has now been maintained at last year's 22½ per cent. The satisfactory figures were well received by the radio market, which had been somewhat dejected by the cut in E.K. Cole's interim from 8 to 6 per cent. Since it was only last February that "Ekco" was able to increase the final dividend for 1946/47, the latest decision indicates the suddeness with which business in this field has contracted. Rothermel 1s. shares are quoted at 3s. 10½d. to yield over 10 per cent on the 40 per cent total payment. E. K. Cole 5s. shares are 6d. better on the week, at 13s. Decca, at 18s. 6d., have been unfavourably affected by the news of a law suit in America. Cossor have gained 9d. at 9s. 3d.

Successful Issues

That subscribers to new issues continue to show a predilection for preference shares is witnessed by the recent offers by Scottish Cables and Christy (Chelmsford). In each case, both preference and ordinary shares were issued with success, but the preference have developed the higher premiums. Both classes of Christy's capital were publicly offered at their par value of £1; the 5 per cent preference are now being dealt in at 23s. and the ordinary at a guinea. Scottish Cables ordinary were placed at 23s. 6d. and the 4½ per cent preference at 22s.; the latter command 1s. premium, the ordinary are 23s. 6d.

Electricity Supply

Street Lighting Conversion. Proposed Merseyside Station.

Birkenhead. — WATERWORKS PLANT. — The Corporation has received permission to borrow £9,000 for the installation of additional generating plant at the Alwen waterworks.

Gateshead.—SODIUM STREET LIGHTING.—The Town Council has received sanction to a £15,000 scheme to replace main road gas lamps by sodium vapour lamps.

Lewisham. — GAS TO ELECTRICITY. — The Borough Council proposes to replace the high-pressure gas street lighting by " Osira " electric lamps at an estimated cost of £15,000.

Llanwrst.—OBJECTION TO OVERHEAD LINES.—The Urban District Council has informed the Merseyside and North Wales Electricity Board that it objects to the erection of overhead lines in the scheme for electricity supplies in its area. It has requested that the whole of the work should be carried out with underground cables.

Millom. — POLICE AND LIGHTING. — With regard to the provision of public lighting at Bootle village, it was reported to the Rural District Council that the Ministry of Transport divisional road engineer had written stating that consent could not be given as the police authorities were not prepared to certify that the lighting was essential for the efficient discharge of their duties.

Merseyside and North Wales.—PROPOSED POWER STATION.—Outlining the power schemes planned by the Merseyside and North Wales Division of the B.E.A. at a Press conference at Liverpool, Mr. A. R. Cooper, controller, referred to a plan to build a new 120,000-kW station near Bold Colliery at an estimated cost of £6,000,000. Half of it was to be in commission by 1952.

Scunthorpe.—COST OF PUBLIC LIGHTING.—Ald. J. Tomlinson, at the meeting of the Scunthorpe Town Council last week, referred to quotations by the Yorkshire Electricity Board for public lighting in the borough which, he said, was to cost £3,800. The estimate previously made by their own department was £2,200. If they had still controlled their own undertaking they would have charged the actual cost to the rates, and not an inflated figure to make sure of a profit. Under nationalization the Council had no bargaining power. Councillor W. Albans, chairman of the Electricity Committee, said the alternative was to set up their own public lighting department, but they would still have to buy their energy. Their existing agreement was for twelve months, and, in the light of experience, they might then be able to ask for a revision of terms.

Skipton.—LIGHTING POLICY.—The U.D.C. Street Committee is proposing to bring all street lamps into use next winter. A saving of fuel will, however, be made by using smaller gas burners and lower wattage electric lamps.

Overseas

Brazil.—HYDRO-ELECTRIC SCHEME. — The Minister of Agriculture has furnished the House of Deputies with information regarding the utilization of the fall of the Paranaiba river at Cachoeira Dourada (Golden Waterfall). The harnessing of this waterfall was studied by the Water Division of the Ministry in 1946 and its report places the potential output at 100,000 h.p. The first stage provides for the installation of a 15,000-h.p. unit at a total cost of 80 million cruzeiros (about £1 million) over a period of three years.

British West Indies.—WHITE RIVER DEVELOPMENT.—The Jamaica Public Service Co., Ltd., proposes to construct a hydro-electric plant of 5,500 kVA nominal capacity on the west bank of the White River. A representative of the Stone and Webster Service Corporation of New York, which acts as operating managers for the Jamaica Public Service Co., will shortly be visiting the United Kingdom to arrange for the purchase of the various items needed. Any United Kingdom firms interested should communicate immediately with the Export Promotion Department of the Board of Trade (quoting reference 38668/48). The station will house a 6,050-h.p., single-runner, vertical-shaft, Francis type hydraulic turbine, operating under a 340 ft net head at 750 r.p.m. normal speed. The generator will be rated at 5,160 kVA, 6,900 V, three-phase, 40-cycle, 750 r.p.m. and designed to operate at a 50-cycle frequency should the company be required to modify its supply at some future date. The switchgear and electrical equipment will consist of 6,900-V oil circuit breakers, instrument transformers, etc.

South Africa.—LITTLE SCOPE FOR HYDRO-ELECTRIC POWER.—Only in a few favourable localities is the generation of hydro-electric power likely to be either physically or economically practicable, according to Dr. D. F. Kokot, chief construction engineer of the Union Department of Irrigation. In a paper read to the annual meeting of the South African Association for the Advancement of Science, Dr. Kokot declared that the flow of South African rivers was too erratic and uncertain for hydro-electric projects and it would be very costly to stabilize them by means of storage dams. Another adverse factor was the fact that water was so scarce in the Union that available supplies had to be reserved for domestic, agricultural and industrial use. Moreover, with the large reserves of coal, power could be produced cheaply in thermal stations.—*Reuter.*

Domestic Demand

Suggestions for Load Limitation

By G. H. BOWDEN, M.I.E.E.

IT has become clear that the present system of domestic electricity supply, planned when no restriction was envisaged, must be modified if industrial needs are to be met. Time and resources are limited, and a simple scheme is therefore essential even though this may involve certain anomalies, difficulties and hardships. Supply authorities can minimize these by educating the housewife in the most economical use of electricity.

The writer suggests that domestic consumers be divided into those using electricity for:

(*a*) lighting and small miscellaneous devices other than space-heating apparatus;

(*b*) water heating not exceeding 3-kW loading, in addition to (*a*);

(*c*) a cooker in daily use and not exceeding 7-kW loading, in addition to (*a*) and (*b*).

Cartridge fuses with sealed enclosures should be installed by the supply authority with minimum ratings of 5, 15 and 30 A respectively.

The consumer should pay a fixed charge based on apparatus installed upon his premises, disconnection and connection of specified apparatus being notifiable to the supply authority. Pending the establishment of consumers' service centres, approved wiring contractors should be licensed to replace blown fuses for a standard charge. To secure some discriminative action when short circuits occur, consumers should be recommended to use quick-acting fuses of the lowest rating on lighting sub-circuits.

A device enabling the housewife safely to replace a blown fuse might be installed by those consumers who objected to frequent payments to the supply authority. Miniature circuit breakers are not entirely satisfactory alternatives because of their relatively slow operation.

The 5-A fuse or 1 kW total load limitation would considerably restrict the use of space heaters by consumers in class (*a*), but lighting and a wide variety of domestic appliances could be freely used provided not more than one appliance was used at a time.

The 15-A fuse would enable a 3-kW water heater to be used at night; to avoid blown fuses the consumer could install a change-over switch so that devices apart from lighting could not be used when the water heater was on.

Where water heaters have two separate elements, as in the dual-purpose type, the plug circuit for miscellaneous appliances might have a change-over switch fitted to control the more heavily loaded element.

The 30-A fuse would enable a reasonably sized cooker to be used at any time, but simultaneous use of either a water boiler or a storage water heater would often result in fuses blowing. The use of a change-over switch on cookers installed by supply authorities is quite common and might be made compulsory for those with cookers, wash-boilers and washing machines, so that the kitchen load could not exceed that of the cooker. To apportion among users the necessary restriction, storage water heaters where installed and plug circuits in other cases should be connected to the cooker change-over switch where there is no wash-boiler. To limit space heating the change-over switch should, perhaps, incorporate a 15-A fuse and be sealed by the supply authority. Unusual combinations of apparatus will present special problems, but these might be left to the electrical contractor acting under advice from the electricity supply authority.

The writer suggests that no domestic consumer's lighting load should be restricted to less than 250 W, nor should any restriction be placed on devices not used for space heating and not exceeding 750-W loading, such as vacuum cleaners, toasters, hair dryers, coffee percolators, mixer-beaters, laundry irons, 2-pint kettles and 1½-gallon water heaters, providing that not more than one device is used at the same time. An exception should be made only to ensure that large water heaters are switched off during the daytime. Such a policy would create a large demand for single-pole switch fuses, and if these were required by the terms of any new domestic tariff there would be plenty of work for the licensed electrical contractor.

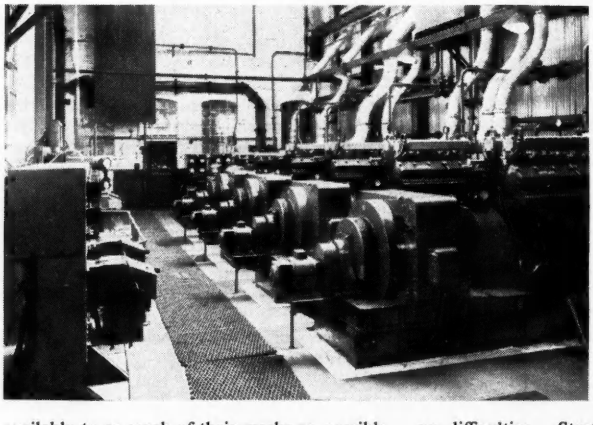
As regards space heating, it would be undesirable to discourage the use of small radiators in bedrooms. A device could therefore be produced which would auto-

matically switch off a radiator after, say, 30 minutes, manual resetting being impossible within 60 minutes after interruption of the circuit. In other cases the domestic radiator is liable to add its burden to the system peak, but it is to be hoped that no absolute ban will be imposed on its use by the consumer who is prepared to go to the expense and trouble of installing devices that will automatically prevent his domestic load exceeding a set limit. The grid load is still very low between midnight and 6 a.m., so the storage type of electric water heater may well become a standard piece of domestic equipment, as gas devices do not compare with it and require considerable maintenance, and the waste of solid fuel for water heating during summer months is prodigious.

Diesel Generating Plant

INSTALLATION AT IPSWICH WORKS

TO minimize inconveniences through power cuts and "staggering," Ransomes, Sims & Jefferies, of Orwell Works, Ipswich, adopted the policy of making independent power available to as much of their works as possible, but owing to the scattered nature of the factories, generating plant to feed the entire establishment could not be installed. It was therefore decided to provide capacity sufficient to run if necessary (under conditions of emergency) the whole of the central group comprising the engineering department, foundry, forge, thrasher department and lawn mower works.



General view of the engine room

The plant installed consists of four V-type twelve-cylinder Paxman diesel engines developing 400 b.h.p. at 1,000 r.p.m., each of which is directly coupled to a 330-kVA alternator of B.T.H. manufacture. It is interesting to note that the engines are a direct development of the type used for the propulsion of assault landing craft during the war. The design is compact and the arrangement of the engines, comprising a number of easily handled and self-contained assemblies, greatly facilitates routine maintenance work.

The alternators are controlled by switchgear panels made by the G. M. Engineering Co., which incorporate an oil-immersed circuit-breaker, voltmeter, ammeter, energy meter and an "Isenthal" automatic voltage regulator. By means of suitable switching arrangements any section of the works can be fed either from the public supply or the alternators. By careful selection of circuits the load can be controlled to the capacity of the plant thus ensuring that a predetermined maximum demand shall not be exceeded according to the purpose in view.

Operation of the plant is extremely simple and experience has shown that both starting and synchronizing present no difficulties. Starting is by 24 V electrical equipment with both starter motor and battery charging dynamo fitted to the engine.

In addition to the a.c. equipment there are two d.c. sets, each comprising a 200-b.h.p. Paxman six-cylinder diesel engine driving a Mawdsley compound dynamo, with a maximum rating of 120 kW. The same system is observed as with the a.c. equipment, double-pole change-over switches being used so that the load can be taken either by the public supply or thrown on to the generators.

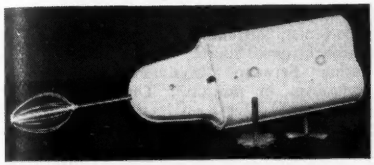
French Morocco Power Development.—In an article published in the *Board of Trade Journal*, H.M. Consul at Rabat says that the production of electric power in French Morocco is almost double that of 1939. The annual output is 300 million kWh but is still insufficient for the country's needs. The dam at Im Fout has been completed and the output is expected to reach 130 million kWh per annum.

RECENT INTRODUCTIONS

NOTES ON NEW ELECTRICAL AND ALLIED PRODUCTS

Battery-Operated Mixers

THE "Daleware" battery-operated mixer, marketed by NEW ERA DOMESTIC PRODUCTS, LTD., 105, Baker Street, London, W.1, is suitable for whisking eggs, creaming condensed milk,



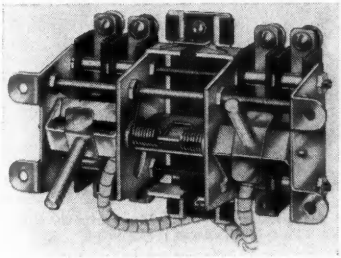
"Daleware" mixer

mixing butter, etc., but not for mixing stiff dough or cake mixtures. Three interchangeable heads are provided. Four "U 2" batteries last from three to four months according to use and the "Reservoil" bearings of the motor require no attention. The mixer is available in either cream or green plastic.

Wash-Boiler Safety Switch

An automatic safety switch for wash-boilers, which embodies a system of thermostatic control is offered by JELSON ELECTRIC, LTD., Coventry Road, Sheldon, Birmingham, 26.

It is intended to take the place of existing switches, and comprises two double-pole micro switches, each rated at 15-A 250 V for a.c. only, which are fitted by means of four retaining screws to the outer casing of the boiler. The switches are placed one on each side of a spring-loaded rocker arm held in the "on" position by means of a bi-metal trigger, which is associated with a 240-W element. A pre-set



Jelson safety switch

thermostatic switch is fitted to an existing stud on the base of the boiler and connected in parallel with the switch element.

When the boiler temperature rises above the pre-set value the thermostat closes the circuit to the element in the main switch, and within ten seconds it is thrown off through its bi-metal trigger. The circuit is re-made by simply depressing either of the switch dollies which will not remain in the "on" position until the boiler temperature is reduced.

The advantages of this unit are that no extra plungers or mechanism are necessary; the connections between switch and thermostat being flexible, the unit is unaffected by distortion or vibration of the boiler.

Hair Dryer

The provision of a wide heating area and the adoption of a new type of fan ensure that the "Magicflow" hand hair dryer has the maximum circulation of hot air without causing an uncomfortable draught of air which merely serves to disarrange the hair without drying it. Metal housing eliminates risk of breakage due to mishandling and there is a heavily insulated

"Magicflow" hair dryer

rubber handle. The induction motor has self-aligning bearings and the hand-operated switches give on/off hot/cold positions. Cream and chromium have been chosen as the standard finish. The makers are CHARLES ALEXANDER & CO., LTD., 74, Portsmouth Road, Surbiton.

Portable Recording Equipment

The "Recordon," a compact, valve-operated magnetic recording and transcribing outfit, introduced by THERMIONIC PRODUCTS, LTD., Pratt Walk, London, S.E.11, is no larger than the average portable typewriter. On the 9-in. diameter magnetic-material-coated paper discs employed about 450 words (representing three minutes' running time) may be recorded. Recording is effected by placing the disc on a turntable, a stylus guiding the recording head over the surface: no indentations are made on the record.

A switch is incorporated in the microphone housing so that the machine may be run only during the actual period of conversation. In

this way it is possible to save considerable amount of recording space. To play back a switch is operated and the microphone then functions as a headphone or loudspeaker. If during the play-back period an error is noticed,

The "Recordon"

it may be eliminated simply by depressing the erase button. The correct wording may then be recorded in the space. By the use of a special erase bar the same disc may be used many times over, though a record once made can, if desired, be kept indefinitely. A further useful feature is that the record can be folded, placed in an envelope and posted for playing back by the recipient. The complete set weighs approximately 11 lb.

Cathode-Ray Tubes

Two new cathode-ray tubes which will be of interest to designers of a.c./d.c. television receivers have become available from MULLARD ELECTRONIC PRODUCTS, LTD., Century House, Shaftesbury Avenue, London, W.C.2. They are a 9 in. type MW22/14C and a 12 in. type MW31/14C with a heater rating of 0·3A at 6·3V enabling them to be series connected with the receiver valves. Although the maximum first anode voltage has been reduced to 300 V, they are directly interchangeable with older tubes. Another tube, type MW22/14, is also in production. It is similar to the 9 in. type already mentioned, but has a coating of "Aquadag" applied externally to the flare of the tube, the purpose of which is to act as one electrode of a smoothing capacitor for the e.h.v. supply.

Diecast Conduit Fittings

The new range of diecast conduit fittings developed by CLANG, LTD., Crown Yard, Cricklewood, London, N.W.2, includes boxes, bends, elbows and interchangeable covers designed to fit $\frac{5}{8}$ and $\frac{3}{4}$ in. conduit. They are finished black and, not being enamelled, they do not tend to chip or rust and are therefore waterproof.

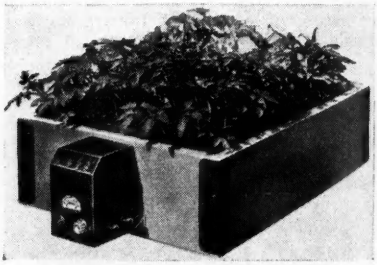
Automatic Gate Operation

An interesting development in the design of collapsible shutters and gates is the introduction of the ray-operated self-opening gate by the BOLTON GATE CO., LTD., Waterloo Street, Bolton, Lancs. Photo-electric cells are placed at a convenient distance on opposite sides of the approach to a shutter gate and any vehicle passing between them sets the opening mechanism in motion. The vehicle passes through and, after a predetermined period, the gates close. The arrangement incorporates all of the normal safety devices; for example, when the current is off the gate may be opened by releasing the manually operated clutch and in case of an obstruction in the gateway the capstan drive automatically slips.

Electro-culture Equipment

Heating devices of several kinds for market gardening and horticulture are now becoming available from EARLY CROPS, LTD., 84, Ladbrook Road, Solihull, Warks., which is a branch of International Engineering Concessionaires, Ltd., 25a, Kensington High Street, London, W.8.

The control panel for space heating in glasshouses includes a pilot lamp, on-off switch, dial thermometer, thermostat regulator and hot-wire vacuum relay switch. The welded steel case, processed to withstand rust, has a terminal block for easy connection to aluminium tubular heaters loaded to 60W/ft and closed with die-cast end caps.



Electrically warmed seed germinator with "Transtat" regulator

For soil warming by buried cable in garden frames there is a step-down transformer for 8 V output in a drip-proof case, incorporating a pilot lamp with on-off switch and "Transtat" temperature regulator. This controller is also used for seed germinating wooden trays which

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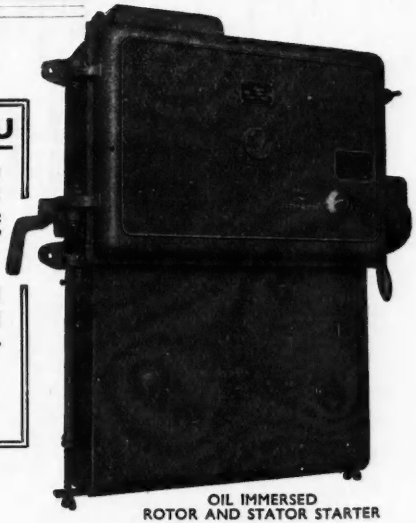

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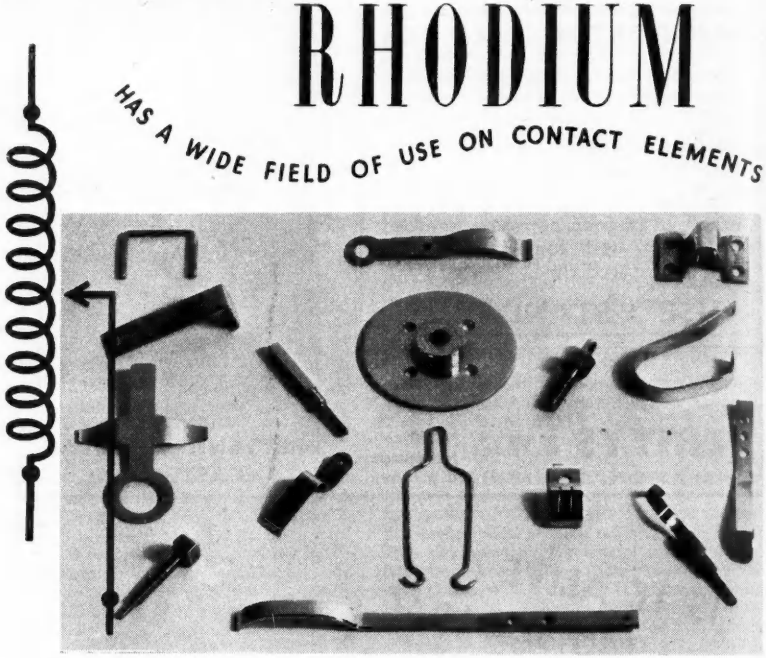

Rhodium is one of the six metals of the platinum group, all of which are characterised by high melting points, great stability and resistance to corrosion. Rhodium is in fact more resistant to chemical attack than platinum, and although it is superficially oxidised on heating to very high temperatures in air, at normal and moderately elevated temperatures it is completely free from oxidation or tarnish. It is much harder and more resistant to wear than platinum, somewhat whiter in colour, and has a higher reflectivity.

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Data Sheet No. 2053 gives information on the Engineering properties and uses of Rhodium. Sent free on request.

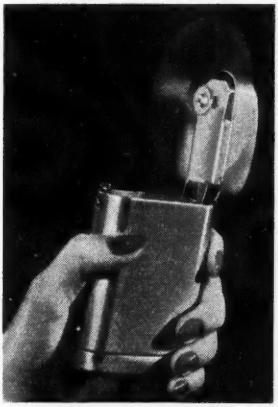
JOHNSON, MATTHEY & CO., LIMITED, HATTON GARDEN, LONDON, E.C.1

GD 95

have perforated metal bottoms to allow conduction of heat from the jointless low-voltage element on an asbestos base. The regulator is similarly used for soilless culture in hydroponic troughs, made of treated steel with plastic linings. The lift-out germinating trays have a lattice base; a float indicator and drain cock are fitted.

Pocket Fan

The "Don Quixote" electric pocket fan placed on the market by the ARRAN ELECTRICAL MANUFACTURING CO., LTD., 54, Hans Place, London, S.W.1, employs a standard 4½-V dry battery, the current consumption of the motor which drives the fan-blades being scarcely more than that of a flashlight bulb. When not in use,



"Don Quixote" electric pocket fan

the fan is completely enclosed in a coloured anodized aluminium case. Pressing the release-button makes the lid spring open, thus exposing the propeller-blades, which instantly begin to rotate. With battery the fan weighs less than 8 oz, and can be comfortably carried in a pocket or handbag.

Panchromatic Fluorescent Lamps

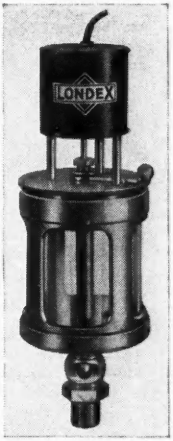
Excellent colour rendering properties are claimed for the "White" fluorescent lamps produced by DURALITE, LTD., 25, Manchester Square, London, W.1. The "White" tube has a colour temperature of 3,500 deg K and it is claimed that there is no colour distortion in normal use such as is found in "Daylight" and "Warm White" fluorescent lamps.

The company's method of manufacture is claimed to ensure a much longer life (approximately 25 per cent) for the lamps than those quantity produced by other methods. The tubes are available in 80-W 5-ft, 40-W 4-ft, 3-ft and 2-ft, and 20-W 2-ft types.

The company will also commence deliveries early in October of its new "Slim Line" 8-ft medium-heat cathode instant starting lamps.

Automatic Lubrication

An automatic lubricating device that does not require any attention apart from occasional re-filling with oil has been introduced by LONDEX, LTD., Anerley Works, 207, Anerley

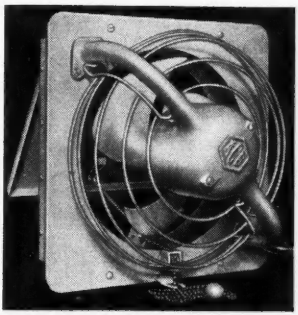


Londex automatic sight feed lubricator

Road, London, S.E.20. It is a solenoid-operated sight feed type so arranged that while the machine is running, the solenoid is energized, thus opening the valve at the bottom of the lubricator to permit the passage of oil to the bearings. The oil feeds to the machine only when it is running and ceases when it comes to a standstill, thus automatic lubrication is ensured and a considerable quantity of oil saved. Coils are available for universal operation on 180/250 V or 150/200 V mains, with ratings of 8 to 11 W.

Window Fans

Window fans suitable for both domestic and commercial use are now available in this country from AIR CONDITIONING & ENGINEERING, 3, Bayley Street, Tottenham Court Road, London, W.C.1. The particular features of these



"Aircon" window fan

"Aircon" fans are silent operation, high air delivery and the provision of weatherproof

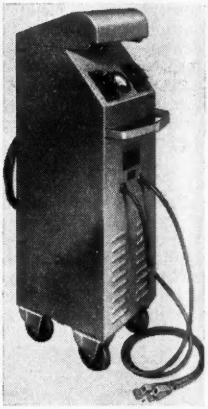
shutters for excluding draughts when the fans are not in use. The beaded pull-chain operates both the outer shutter and the fan switch.

Miniature Ceramic Capacitors

An addition of two components to the "Hi-K" range of miniature ceramic capacitors is announced by the UNITED INSULATOR CO., LTD., Oakcroft Road, Tolworth, Surbiton, Surrey. One is a television smoothing or h.t. by-passing capacitor measuring 50 mm long by 20 mm diameter with a capacitance of 1,000 pF and a rating of 10 kV d.c. working. The other is a high current lead-through capacitor for r.f. heaters and radio transmitters, which is intended to act as a feed-through bushing with a capacitance to ground of at least 1,000 pF and having a centre rod capable of carrying 200 A.

Mobile Battery Charger

A heavy-duty mobile battery charger, which is intended for use in garages and similar situations, is offered by F. C. HEAYBERD & CO., LTD., 28, Russell Square, London, W.C.1. It incorporates metal rectifiers and will charge at 12 V 30 A, or 24 V 15 A, the output being controlled by means of a stud switch varying tappings on the input transformer. The control panel carrying the ammeter, fuses and switches is mounted at an angle and is illuminated to facilitate ease of adjustment. Finished in light grey enamel, the standard unit is available for operation on 200/250 V 50 c/s mains, but models can be made to suit customers' particular requirements.



Heayberd heavy-duty mobile battery charger

Britain's Power Shortage

AN AMERICAN VIEW

OUR readers are well aware of our attitude towards the "authorities" in the matter of power plant. We feel that to go on from year to year with inadequate generating facilities hoping that restrictions will preserve some sort of balance between supply and demand is a suicidal policy.

The Government attaches much importance to American views on industrial matters and may be impressed by the following extract from a recent editorial in the New York *Electrical World* which closely backs up our contentions:—

> "Nationalized or privately-owned, any power system which accepts as inevitable a situation where the urge is to conserve electricity, rather than use more and more of it, is a power system which isn't doing its job. It may be charged that any such bland pronouncement ignores the realities of Britain's economic position. But it can be charged in return that perhaps too great a concern is being paid these economic realities.
>
> "Why is England skimping on everything her citizens want for a better life? To get more and more production available for export. Why such emphasis on exports? To get foreign currency. Why? To be able to import what it needs to live and rebuild. To rebuild? Rebuild to what? To a world stature such as it has known. And is England going to regain its former heights in trade, in manufacturing, in standard of living by conserving electric power? Not if the United States is any example of how to grow to great stature. The path England must follow is just the opposite of power conservation. England has to learn what power is and how to use it.
>
> "If nationalized power in England is conserving energy only until new machines can be got into place, there's no worry. But if it's restricting the use of power, deliberately and over a long term, in favour of added production elsewhere, then the British are in a lot worse shape than we ever believed they were."

Radio in East Africa

A NEW system of short-wave radio communication is planned in East Africa, where a total of forty-eight Marconi short-wave transmitters are to be installed to provide a comprehensive communications network for ground to air and point to point communications for the rapidly expanding civil aviation services, both local and trunk routes, and for administrative, public and meteorological traffic. The new services, which will operate throughout the three territories of Kenya, Uganda and Tanganyika, are required to meet the needs of post-war expansion and reorganisation of the East Africa Posts and Telegraphs Department's Services. Work has already begun at the Marconi Company's Chelmsford Works on construction.

Ceylon's Imports

Recovery in 1947

LAST year the electrical import trade of Ceylon made an all-round recovery, particularly on the apparatus side. At the same time the value of electrical machinery increased, though to a less extent. The accompanying table shows the value of the principal electrical imports in 1947, with a note of the increases on 1946. (Rupee = 1s. 6d.) Competition has returned from several countries, the share of Hong Kong in the smaller lines being noteworthy.

An agreement between Great Britain and Ceylon covering the use of the latter's sterling balances until the end of 1948 stipulates that while this country shall do what is possible to help Ceylon develop her natural resources, Ceylon is to co-operate in conserving the dollar resources of the sterling area.

The Colombo correspondent of *The Times* recently reported that an engineering firm in Denver, Colorado, was to receive the contract for building a dam for one of the largest irrigation and water-power schemes in the history of Ceylon. The Ceylon Parliament has passed the preliminary estimate of the Gal-oya scheme, as it is called, which will bring under cultivation 132,000 acres.

Class of Goods and Supplying Countries	1947 Rs. (000)	Inc. or dec. on 1946 Rs. (000)
Control and switchgear	262	+ 57
From United Kingdom	249	+ 44
„ *Switzerland*	11	+ 11
Generators, dynamos and exciters	248	+ 43
From United Kingdom	211	+ 11
„ *Switzerland*	37	+ 37
Motors	171	+ 24
From United Kingdom	156	+ 16
„ *Australia*	9	+ 7
Transformers and convertors	79*	+ 8
Elec. machinery, unspecified	510	+ 40
From United Kingdom	414	+ 43
„ *Australia*	14	+ 6
„ *India*	44	− 7
„ *Italy*	16	+ 16
„ *United States*	14	− 26
Wires and cables, rubber insulated	863	+ 504
From United Kingdom	814	+ 455
„ *Hong Kong*	38	+ 38
„ *Australia*	8	+ 8
Wires and cables, other	578*	+ 364
Lamp bulbs, gas filled	297	+ 15
From United Kingdom	289	+ 7
„ *Holland*	7	+ 7
Other lamp bulbs	140	− 16
From United Kingdom	126	− 30
„ *Holland*	8	+ 8
Torch bulbs	233	+ 47
From United Kingdom	24	+ 6
„ *Canada*	26	+ 26
„ *Hong Kong*	162	− 5
Lighting accessories and fittings	1,403	+ 828
From United Kingdom	476	+ 194
„ *Australia*	43	+ 16
„ *Hong Kong*	839	+ 576
„ *Holland*	19	+ 19
Radio apparatus	1,727	+ 734
From United Kingdom	1,241	+ 380
„ *Australia*	48	+ 36
„ *France*	42	+ 42
„ *Holland*	91	+ 61
„ *United States*	272	+ 212
Other telegraph and telephone apparatus	319*	+ 167
Dry batteries, not radio	2,370	+ 980
From United Kingdom	489	+ 24
„ *Australia*	137	+ 122
„ *Canada*	665	+ 665
„ *Hong Kong*	710	− 22
„ *United States*	346	+ 340
Batteries and accumulators, unspecified†	406*	+ 269
Other elecl. goods and apparatus	926	+ 339
From United Kingdom	841	+ 305
„ *United States*	61	+ 26
„ *India*	11	+ 7

* All or mainly from United Kingdom.

† Except splashproof for motor vehicles.

West Indian Trade

NOT only have imports into the West Indies from hard currency countries been restricted but licences for certain goods from the United Kingdom have also been limited. According to Barclays Bank (Dominion, Colonial and Overseas) it is felt that consumers' post-war needs have been filled to a large extent.

Compared with 1947, British Guiana trade in electrical apparatus showed increased activity during the first quarter of 1948. Total imports for this quarter were valued at $167,000, whereas for the corresponding period of 1947 they were $95,500. This year the share of the United Kingdom was $61,800, Canada's $36,500 and that of foreign countries $69,000, including Holland (lamps and radio goods).

Imports of electrical goods into Barbados in 1947 totalled £130,000 in value compared with £106,200 in 1946. Included in last year's figure were radio sets and parts (£9,900), refrigerators (£2,000) and unspecified electrical appliances (£118,600.) More than two-thirds of the trade was done by the United Kingdom, with Canada, the United States and Holland sharing the remainder.

Jamaica's imports of electrical apparatus and generating machinery in 1946 were more than double in value those of the previous year, the totals being £218,200 and £93,500 respectively. There was a big increase in radio material. The chief contributing countries to the electrical trade as a whole were:—United Kingdom (£97,300), United States (£75,800) and Canada (£43,000).

The electrical import trade of Trinidad in 1946 fell off compared with 1945 on the machinery side but increased in many lines, notably radio, cookers, refrigerators and lighting appliances.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

F. SIGMUND and W. S. Hlavin.—"Cooling means for dynamo-electric machines." 17302. 20th October, 1943. (605,435.)

1944

British Thomson-Houston Co., Ltd.—"Turret mechanisms for moving rotatable work-supporting heads to a plurality of stations in turn." 577. 14th January, 1943. (605255.)

British Thomson-Houston Co., Ltd.—"Circuit interrupting devices." 4186. 11th March, 1943. (605439.)

Sperry Gyroscope Co., Inc.—"Electron-discharge apparatus." 12592. 16th June, 1943. (605257.)

Budd Wheel Co.—"Induction heating apparatus." 16847. 2nd September, 1943. (605443.)

Metropolitan-Vickers Electrical Co., Ltd., and A. Tustin.—"Phase advancing electric networks." 16979. 5th September, 1944. (605259.)

Electro Manganese Corporation.—"Electrodeposition of manganese." 23846. 1st February, 1944. (605448.)

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Minneapolis-Honeywell Regulator Co.—"Electric automatic regulating systems." 188/9. 22nd February, 1943. (605449/50.)

Standard Telephones & Cables, Ltd.—"Coating limited area of rectifier discs." 495. 20th March, 1944. (605319.)

Landis & Gyr Soc. Anon.—"Recording apparatus, for use with consumption meters." 1332. 17th January, 1944. (605321.)

R. A. Webber.—"Manufacture and construction of electrically-heated vessels for domestic and industrial use." 3203. 8th February, 1945. (605322.)

Standard Telephones & Cables, Ltd.—"Multiple-course radio beacon." 11453. 12th June, 1944. (605459.)

J. E. Barrand, R. J. McGurk and R. R. Waller.—"Electric paint-scraper and remover." 14212. 6th June, 1945. (605328.)

C. Herzog.—"Manufacture of cold electrode fluorescent-discharge lamps." 14395. 25th January, 1944. (605329.)

C. Herzog.—"Cold electrode fluorescent lamp." 15084. 7th March, 1944. (605330.)

Patelhold Patentverwertungs- & Elektro-Holding Akt.-Ges.—"Supervisory devices for radio communication apparatus." 16812. 1st July, 1944. (605464.)

General Electric Co., Ltd., and S. W. Richards.—"Joints for flame-proof conduits." 17050. 4th July, 1945. (605269.)

N. C. Barford.—"Electron-discharge devices employing hollow resonators." 23826. 14th September, 1945. (605469.)

H. J. Ransburg, H. G. Ransburg, H. P. Ransburg, and E. M. Ransburg (trading as H. J. Ransburg Co.).—"Method and apparatus for electrostatically coating articles." 25021. 29th September, 1944. (605338.)

Bendix Aviation Corporation.—"Electromagnetic induction device." 26230. 31st October, 1944. (605473.)

Philco Radio & Television Corporation.—"Electron focusing apparatus." 28189. 31st October, 1944. (605341.)

Scophony, Ltd., and H. F. Charlotte.—"Electric-discharge lamps." 29240. 3rd November, 1945. (605343.)

A. C. Cossor, Ltd., and D. A. Bell.—"Devices for the adjustment of electrical circuits." 31962. 27th November, 1945. (605281.)

G. L. Ashdown.—"Coupling devices for electromagnetic waveguides or other tubular members." 33947. 14th December, 1945. (605348.)

Allmanna Svenska Elektriska Aktiebolaget.—"Method of insulating electrical machines and apparatus." 34386. 30th December, 1944. (605287.)

Patelhold Patentverwertungs- & Elektro-Holding Akt.-Ges.—"Fixing arrangement for piezo-electric crystals." 34399. 23rd December, 1944. (605288.)

J. O. Davis, and C. S. Wright.—"Electrical connections." 34414. 19th December, 1945. (605295.)

Horstmann Gear Co., Ltd., B. G. Horstmann, and F. O. Horstmann.—"Centrally or semi-centrally controlled electric switching systems for the control of public lighting and for other purposes." 34423. 19th December, 1945. (605296.)

Western Electric Co., Inc.—"Electrical resonance chambers." 34437. 28th December, 1944. (605300.)

General Electric Co., Ltd., English Electric Co., Ltd., G. J. H. Bignell and J. W. Gibson.—"Fusible electric cutouts." 34449. 19th December, 1945. (605304.)

Radio & Television Trust, Ltd., and C. P. V. Vaufrouard.—"Inductance coils for radio apparatus and the like." 34465. 19th December, 1945. (605306.)

Philips Lamps, Ltd.—"Inductance coils." 34494. 9th November, 1940. (605349.)

Philips Lamps, Ltd.—"Plate or disc-shaped bodies of ceramic material or glass for use in electron-discharge tubes." 34498. 27th November, 1940. (605350.)

Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—"Ceramic insulators." 34499. 25th November, 1940. (605351.)

Philips Lamps, Ltd.—"Frequency-changing arrangements." 34500. 5th December, 1940. (605352.)

Philips Lamps, Ltd.—"Tuning devices for superheterodyne receivers." 34501. 5th December, 1940. (605353.). "Circuit arrangements for electric-discharge tubes." 34502. 10th December, 1940. (605354.) "Electron-discharge tubes." 34504. 30th December, 1940. (605355.) "Devices for measuring small direct voltages." 34506. 6th January, 1941. (605356.)

Carlisle Electrical Manufacturing Co., Ltd., and H. V. Carlisle.—"Combined electrical switches and fuses." 34540. 20th December, 1945. (605362.)

Prince-Smith & Stellis, Ltd., and E. E. Feather.—"Electrically-controlled stop motions for spinning, twisting, and analogous machines." 34556. 20th December, 1945. (605365.)

A. C. Cossor, Ltd., and J. S. Eagle.—"Electric terminals." 34590. 20th December, 1945. (605370.)

A. C. Cossor, Ltd., and K. I. Jones.—"Thermostatic control." 34593. 20th December, 1945. (605378.)

J. & H. Lowe (Cranes), Ltd., and E. Wadsworth.—"Electric control switches." 34608. 20th December, 1945. (605380.)

Patelhold Patentverwertungs- & Elektro-Holding Akt.-Ges.—"Short-wave multiple channel telephony and signalling." 34691. 21st September, 1945. (605396.)

British Thomson-Houston Co., Ltd., and R. S. Wells.—"Luminescent compounds." 34694. 21st December, 1945. (605398.)

British Insulated Callender's Cables, Ltd., and A. M. Hamilton.—"Bridges or bridge-like structures." 34747. 21st December, 1945. (605404.)

Standard Telephones & Cables, Ltd.—"Voice frequency signalling systems." 34759. 26th December, 1944. (605408.)

General Electric Co., Ltd., and C. H. Marshall.—"Railway wagon retarders." 34763. 21st December, 1945. (605409.)

Aktiebolaget Elektrolux.—"Absorption refrigerating apparatus." 34776. 22nd January, 1945. (Cognate application 34777/45.) (605415.)

British Industrial Plastics, Ltd., A. Brookes, and F. L. Hudson.—"Manufacture of resinous condensation products." 34780. 21st December, 1945. (605417.)

Landis & Gyr Soc. Anon.—"Motor protection switch with quick release." 34789. 23rd December, 1944. (605418.)

Muirhead & Co., Ltd., and J. A. B. Davidson.—"Step-by-step variable resistances." 34791. 21st December, 1945. (605419.)

Telefon Fabrik Automatic Aktieselskabet.—"Polarized relays." 34811. 15th December, 1941. (605422.)

Marconi's Wireless Telegraph Co., Ltd.—"Electron discharge tube amplifiers." 34842. 23rd December, 1944. (605427.)

M. P. Winther.—"Eddy-current couplings." 34864. 16th April, 1942. (605430.)

C. H. Parsons, Ltd., and G. B. Handley.—"Electrical

plug-and-socket connectors." 34915. 27th December, 1945. (605500.)

J. E. Dyson, and J. Delaney.—" Prepayment electricity meters." 34920. 27th December, 1945. (605501.)

Walsall Conduits, Ltd., and A. E. Price.—" Interlocked enclosed electric switchgear." 35023. 28th December, 1945. (605521.)

Ferranti, Ltd., H. Wood, R. H. Davies and J. R. Whitehead.—" Super-regenerative radio receivers of the type associated with transmitting means." 35039. 28th December, 1945. (605523.)

Akt.-Ges. Brown, Boveri, & Cie.—" Arrangements of grid-controlled convertors by which a motor is fed from an alternating-current network." 35041. 6th July, 1945. (605371.)

Revo Electric Co., Ltd., and F. H. Reeves.—" Electric tumbler switches." 35202. 31st December, 1945. (605549.)

Standard Telephones & Cables, Ltd.—" Telephone jack strips and similar devices." 35318. 30th December, 1944. (605312.)

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R. A. Webber.—" Construction of electrically-heated vessels for domestic and industrial use." 12341. 8th February, 1945. (Divided out of 605322.) (605373.)

Delaware Engineering Corporation.—" Furnace electrode regulators." 19879. 12th August, 1943. (Divided out of 599848.) (605313.)

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where " Contracts Open " are advertised in our " Official Notices " section the date of the issue is given in parentheses.

Argentina.—BUENOS AIRES.—Institute Argentine de Promocion del Intercambio. Complete generating plant for seven power stations of the following capacities:—One 18,750 kW, one 12,000 kW, one 8,400 kW, one 2,550 kW, one 1,800 kW and two 1,450 kW. Tenders are required within ninety days from 24th June and should be sent to the Institute at Asesoria Tecnica, Cangallo 524, Buenos Aires. (Ref. E.P.D. 38418/48.)*

Belgium.—23rd August. Belgian State Railways. Sundry electrical equipment. (Ref. E.P.D. 39137/48.)*

Musselburgh.—11th September. Town Council. Electrical work for public wash-house extension. Schedules, etc., from burgh surveyor, Municipal Office.

Newcastle-on-Tyne.—Education Committee. Electric lighting and power installation at the new Lindfield Primary School, Blakelaw Estate. Plans are by the City Education Architects' Department, 31, Northumberland Road.

Salford.—23rd August. North Western Electricity Board (No. 1 Sub-Area). Electrical installation at the North Salford Secondary Modern School. (See this issue.)

Wanstead and Woodford.—24th August. Corporation. Installation of 400-W mercury vapour lighting on various roads in the borough. (See this issue.)

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

Australia.—Sydney County Council. 50,000-kW turbo-alternator for Bunnerong power station (£422,671).—C. A. Parsons. Two 300,000 lb/hr boilers, feed pumps, steam piping, ash handling plant, etc. (£1,581,348).—Simon-Carves.

Durham.—County Council. Accepted. Installation of fluorescent lighting at the Easington Guardians' offices (£108).—R. Keeler. Telephone switchboard and battery room for Shire Hall telephones (£212).—T. W. Gilderoy & Son. Intercommunication telephones, county architects' office, Court Lane, Durham (£300).—H. Alderson. Electrical installation, Teams pedestrian subway (£132).—Sleigh & Wood.

Farnborough.—Accepted. Electrical installation in 200 council houses.—Alpha Manufacturing & Electrical Co.

South Shields.—Education Committee. Accepted. Rewiring at the Baring Street School (£1,006).—T. Sloan, Newcastle-on-Tyne.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Alcester.—Houses (50), Bidford-on-Avon and Studley, for R.D.C.; Francis B. Andrews & Son, architects, 95, Colmore Row, Birmingham, 3.

Ashbourne.—Central omnibus station for U.D.C.; D. Powell, surveyor, Council Offices.

Ayr.—Public school, Braehead (£47,000); county architect, Ayr.

Bangor (North Wales).—New out-patients' department at the Caernarvonshire and Anglesey Infirmary; Watkins Jones & Son, builders, Mount Street.

Barrow-in-Furness.—Nursery school, Greengate, for T.C.; J. N. Flitcroft, borough education architect, Town Hall.

Bath.—Nurses' training school and operating theatre, Royal United Hospital; A. J. Taylor & Partners, architects, 4/5, Bridge Street.

Bedlington.—Houses (38), Hollymount Square, for the U.D.C.; direct labour.

Belford (Northumberland). — Houses (36); R.D.C. surveyor.

Biggar.—Ice cream factory; J. Shannon, architect, 45, High Street.

Blackburn.—Infants' school, for St. Joseph's R.C. Church (£35,000); Rev. J. J. O'Connor, the Presbytery, Audley.

Brighton.—Factory, Hollingbury; Oswalds & Ridgway, Ltd., engineers, 30, Strutton Ground, London, S.W.1.

Carlisle.—Houses for the City Council; builders, J. Laing & Sons, Dalston Road (50); Building & Repairs Co., Ltd., Crummock Street (22); J. F. Johnstone, Byron Street (12); and Barwick Brothers, Gilsland (14).

Chester.—Secondary modern school at Handbridge; Charles Greenwood, city engineer, Municipal Offices.

Christchurch. — Infants' school (£74,000); county architect, The Castle, Winchester.

Conway.—Houses (44), Mount Park estate, for T.C.; L. Mosley, architect, The Estate Office.

Darlington.—Pattern shop for the Darlington Railway Plant & Foundry Co., Ltd.; E. Black & Sons, builders.

Deal.—Permanent houses (118), Orchard Avenue; J. L. Sharratt, borough engineer, Municipal Offices, Queen Street.

Doncaster.—Health centres, Wheatley Park, Balby and town centre; borough engineer.

Edinburgh.—Building (£25,000) for Edinburgh and Dumfriesshire Dairy, West Bryson Road; manager.

Eton.—Houses (50), Gerrards Cross and Iver Heath, for R.D.C.; Sir John Brown and A. E. Henson & Partners, 117, Sloane Street, London, S.W.1.

Grangemouth.—Houses (148); burgh surveyor.

Grimsby.—Houses (106), Little Coates Road; borough engineer.

Hambledon.—Sewage works, Chiddingfold, for R.D.C.; Streeter & Co., Ltd., Godalming, contractors: A. P. I. Cotterell & Son, consulting engineers, 54, Victoria Street, S.W.1.

Harworth.—Factory, Scrooby Road, for J. B. Lewis & Sons, Ltd., Nottingham; Bromley & Cartwright, architects, 6, Clarendon Street, Nottingham.

Hatfield.—Factory; British Drug Houses, Ltd., Graham Street, London, N.1.

Hyde.—Catholic primary school in Victoria Street; Rev. H. Nixon, P.P., St. Paul's Church, St. Paul's Road.

Inverness.—Houses (225); Scottish Special Housing Association Ltd., 15, Palmerston Place, Edinburgh.

Keighley.—Warehouse and extensions, Dalton Dye Works; Atkinson Dyeing Co., Ltd.

Lancaster.—Pathological Department at Royal Lancaster Infirmary; E. Middleton, architect, 1, Queen Street.

Middlesbrough.—Oil bunkering and distribution installation at Teesport for Shell-Mex & B.P. Ltd., Shell-Mex House, Strand, London, W.C.2.

Newcastle-on-Tyne.—Operating theatre, etc., at St. Nicholas' Hospital for the City Council; city architect, 18, Cloth Market.

Garage and workshop, Corporation Street, for Irvine Motors Ltd.; M. A. Mackenzie, architect, Mawson Swan Buildings, Mosley Street.

Extension of the factory of A. S. Wilkin Ltd., Cremona Confectionery Works, Benton Road; C. S. Errington, 46, Grainger Street.

Newcastle (Staffs.).—Branch library on the Bradwell estate; J. W. Tonge, borough surveyor, Lancaster Buildings.

Northampton. — Houses (90), Dallington Fields; borough architect, Guildhall.

Oldham.—Primary school on Oldham Garden City site, Hathershaw; J. W. Hitching, schools architect, Education Offices, Union Street West.

Pontefract. — Factory, Whitehouse, Ferrybridge, Pollards Bearings (Birmingham), Ltd.; E. Gordon Crofts, architect, Market Place.

Portsmouth.—Houses (455), Leigh Park site; city architect, Corporation Offices, Southsea.

Rishton.—Nursery school at West End; G. Noel Hill, county architect, County Offices, Preston.

Rugby.—Permanent houses (102); Collins & Britton, 39, Bennetts Hill, Birmingham, 2.

Scalby.—Primary school, for North Riding E.C.; W. Tocher, architect, 8, Blenheim Terrace, Leeds, 2.

Sedgefield.—Houses for old people (300); R.D.C. surveyor.

Sheffield.—Dental hospital (£150,000), for the Royal Sheffield Infirmary Board; Adams, Holden & Pearson, architects, University of London, W.C.1.

South Shields.—New Harton Downhill and Marsden Road school for the E.C. (£108,000); G. Bailey, Ltd., builders, King Street.

Fifty Newland type houses; borough engineer, Town Hall.

Civic restaurant, South Foreshore; borough engineer.

Stockton-on-Tees.—Houses on 144 acres of land in the Durham Road and Darlington Lane area; A. G. Sinclair, borough architect, 124, High Street.

Stoke-on-Trent.—Central museum and art gallery, Bell Pottery site; J. R. Piggott, city architect, Town Hall.

Stourbridge.—Nurses' home, and laundry, Hillville, for Worcestershire C.C.; Robinson & Kay, architects, Victoria Chambers, High Street.

Stretford.—New factory at Chester Road for Chiswick Electric Lamp Manufacturing Co., Ltd., Hadfield Street, Trafford Park.

Tynemouth.—Nurses' home, Manor Road, for the Victoria Jubilee Infirmary; Cackett, Burns Dick & McKellar, architects, 21, Ellison Place, Newcastle-on-Tyne.

Wallsend.—Joinery works at Oak Grove for H. C. Bell & Co., Back High Street.

Wallsend-on-Tyne.—Depot, Oak Grove; Eldorado Ice Cream Co., Ltd., Smithfield, E.C.1.

Worthing.—Factory buildings, Northbrook Road; M. Rainsford Fletcher, architect, 13, Ambrose Place.